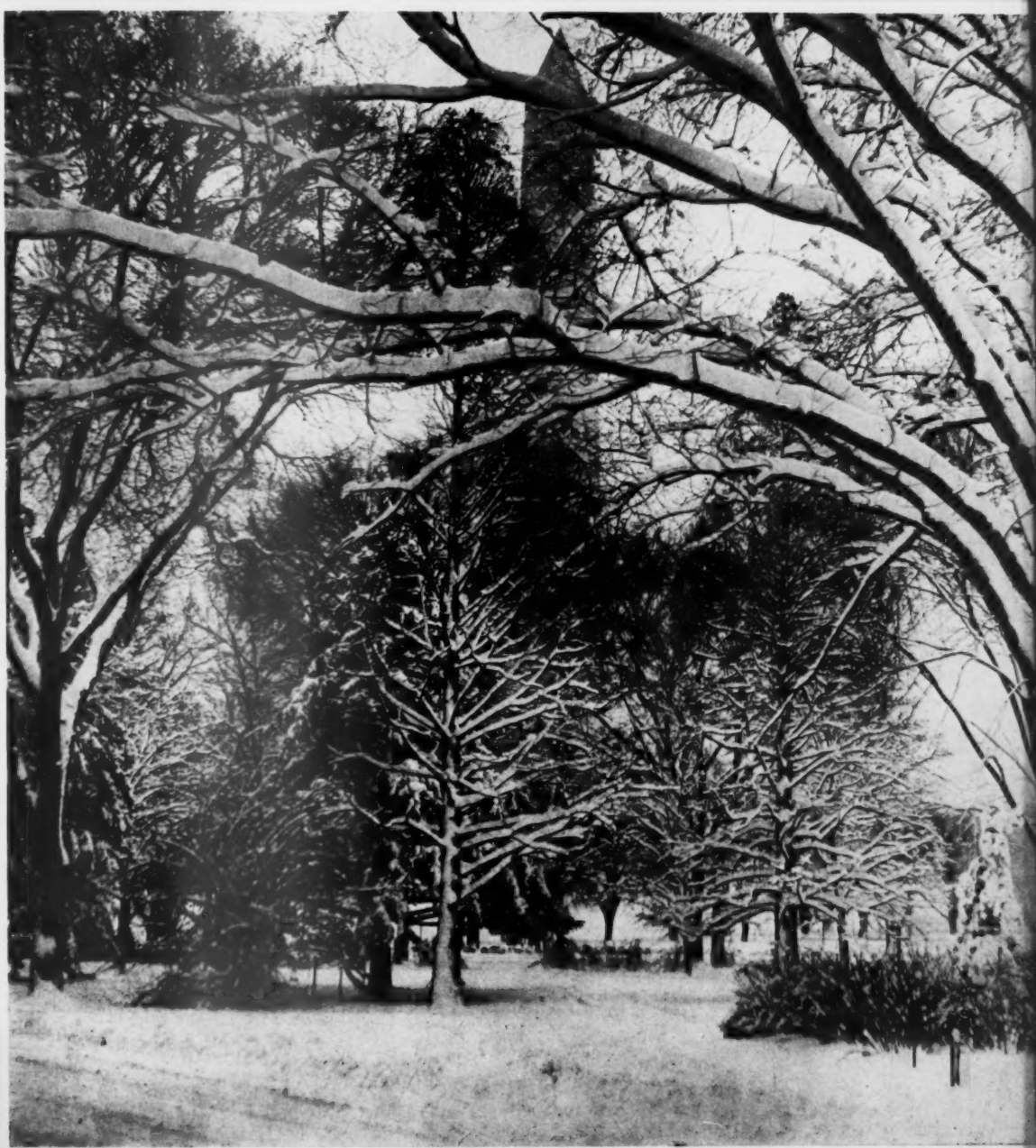
MINING CONGRESS JOURNAL

V25 | 12 DEC 39

DECEMBER, 1939



Merry Christmas — Happy New Year

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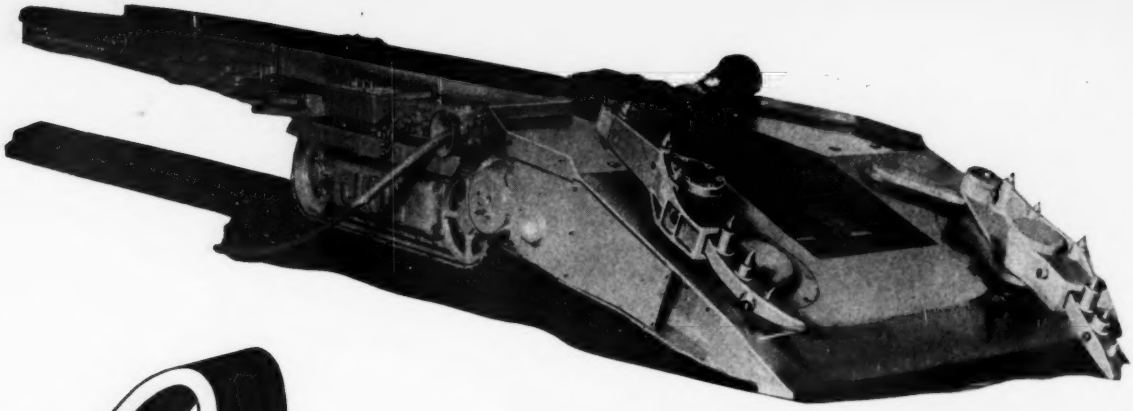
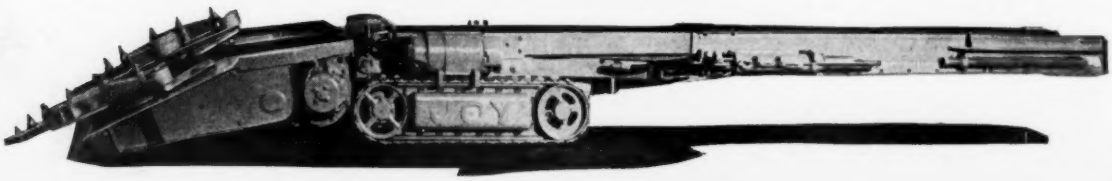


Joy 14-BU LOADER

Provides Low Seam Operations with High Seam Capacity. Five Tons a minute from this 26" high JOY Loader.

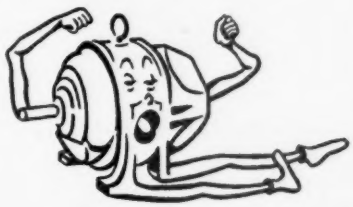
Consult a JOY Engineer on your mechanizing plans.



JOY MANUFACTURING CO.
FRANKLIN ··· PENNSYLVANIA

Are "Undernourished" Motors KEEPING THE TONNAGE DOWN?

Pep them up with proper voltage . . . use G-E portable-substation equipment



MOTORS "live" on electricity—so if the ones in your mine seem undernourished, pep them up by assuring proper voltage at the working face.

G-E portable-substation equipment will do the job for you.

You're almost sure to get a low-voltage condition when operations advance too far from the d-c substation. Motors slow down, machines falter, production slips. Improving this condition by installing additional feeder copper soon becomes uneconomical.

Therefore, why not keep the voltage up by making it an easy matter to bring the substation up to the working face? That was the reasoning that led to the building of the first G-E portable-substation equipment ten years ago.

Designed for Portability

Today you can come to General Electric and get just the equipment you want—compactly designed, mounted on wheels, factory assembled and wired, and equipped with coupling devices in the power and control circuits. It can be moved up and put back in service in a few hours. No expensive foundations are required—the set can be operated standing on its wheels. And the installed cost is no more than for a conventional-type substation.

When you consider portable-substation equipment for your mine, you'll find the experience of G-E engineers of value to you. They know the varying conditions that exist throughout the mining industry and can help you with your special requirements. Just get in touch with our nearest representative. General Electric, Schenectady, N. Y.

Report on G-E Portable-substation Equipment at Walter Bledsoe Company Mine

The first portable-substation equipment—a G-E 150-kw synchronous converter—was built ten years ago by General Electric for the Dresser Mine of the Walter Bledsoe Company, Terre Haute, Indiana.

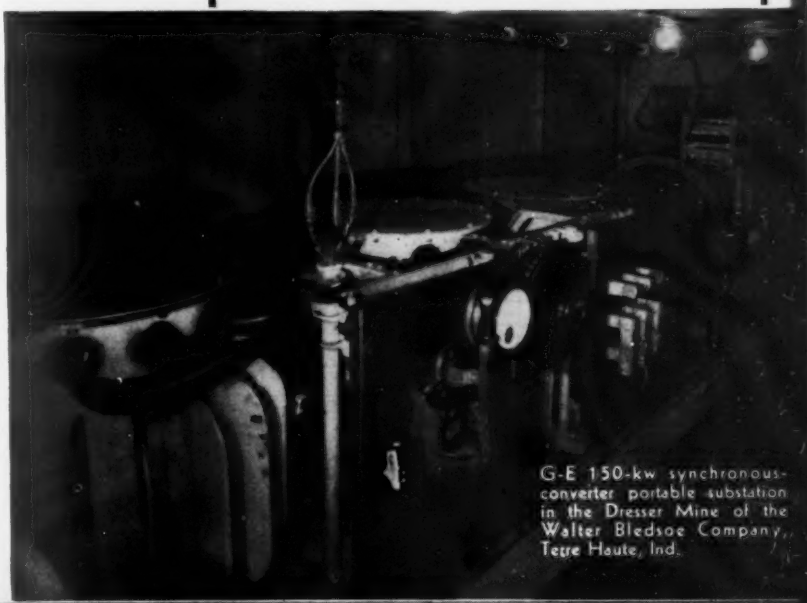
Time and money saved and not a minute's trouble in ten years is, in effect, what the superintendent of the mine said about it recently. He pointed out that, in addition to improving the voltage at the working face and reducing power losses, its installation had resulted in other advantages. For example:

1. **Time required** to move the substation reduced from an entire week to eight hours. (Previously, the company had used an underground substation of the conventional type, moving it closer to the working face from time to time.)

2. **Cost** of putting down bore holes eliminated; power line was formerly run overground.

3. **Possibility of outages** during lightning season greatly reduced by eliminating the overhead lines.

4. **Shorter power interruptions.** One person, inside the mine, can control the equipment.



G-E 150-kw synchronous-converter portable substation in the Dresser Mine of the Walter Bledsoe Company, Terre Haute, Ind.

GENERAL ELECTRIC

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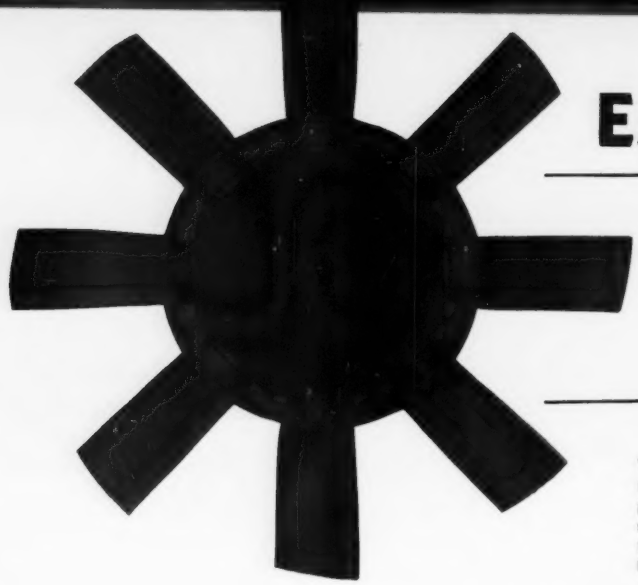
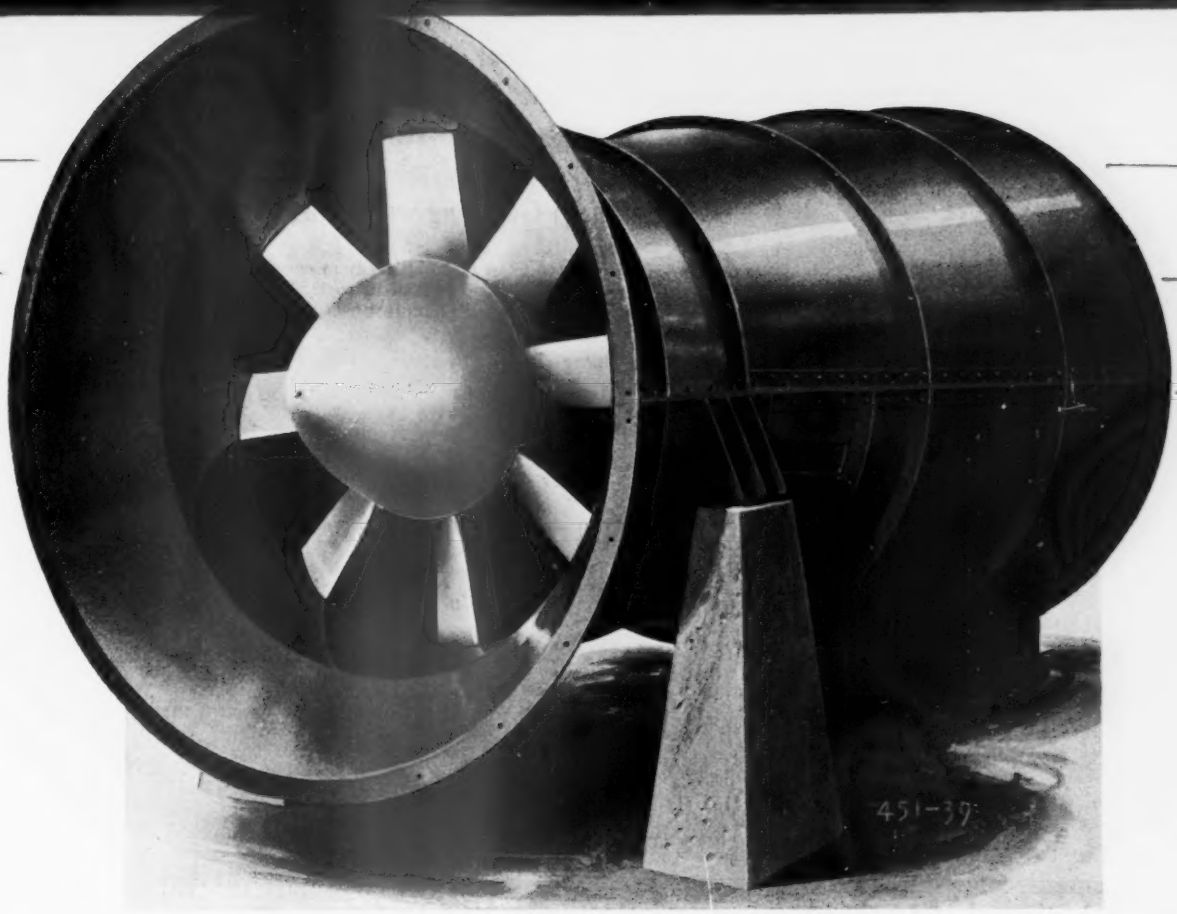


EASY TO SELECT A FAN OF THE RIGHT SIZE

The table below will facilitate your selection of a Jeffrey mine fan to suit your needs exactly. The bold face type gives the fan diameters . . . light face type indicates the size of standard motor recommended. For all duties to right of zigzag line the fan should be direct connected to motor.

Selection Table

VOLUMES IN CU. FT. PER MIN.	WATER GAUGE PRESSURES															
	½"	1"	1½"	2"	2½"	3"	3½"	4"	4½"	5"	5½"	6"	6½"	7"	7½"	8"
20,000	**42"**	**36"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**
	2½HP	5HP	7½HP	10HP	15HP	15HP	15HP	20HP	20HP	25HP	25HP	25HP	30HP	30HP	40HP	40HP
30,000	**48"**	**42"**	**42"**	**36"**	**36"**	**36"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**	**30"**
	5HP	7½HP	10HP	15HP	20HP	20HP	25HP	30HP	30HP	40HP	40HP	40HP	50HP	50HP	50HP	60HP
40,000	**60"**	**48"**	**42"**	**42"**	**42"**	**36"**	**36"**	**36"**	**36"**	**36"**	**36"**	**36"**	**36"**	**36"**	**36"**	**36"**
	5HP	10HP	15HP	20HP	25HP	30HP	40HP	40HP	40HP	50HP	50HP	60HP	60HP	60HP	75HP	75HP
50,000	**60"**	**60"**	**48"**	**48"**	**42"**	**42"**	**42"**	**42"**	**42"**	**36"**	**36"**	**36"**	**36"**	**36"**	**36"**	**36"**
	7½HP	15HP	20HP	25HP	30HP	40HP	40HP	50HP	50HP	60HP	60HP	75HP	75HP	75HP	100HP	100HP
60,000	**72"**	**60"**	**60"**	**48"**	**48"**	**48"**	**42"**	**42"**	**42"**	**42"**	**42"**	**42"**	**42"**	**42"**	**42"**	**42"**
	7½HP	15HP	20HP	30HP	40HP	40HP	50HP	60HP	60HP	75HP	75HP	100HP	100HP	100HP	100HP	100HP
70,000	**72"**	**60"**	**60"**	**60"**	**60"**	**48"**	**48"**	**48"**	**48"**	**48"**	**42"**	**42"**	**42"**	**42"**	**42"**	**42"**
	10HP	20HP	25HP	30HP	40HP	50HP	60HP	60HP	75HP	75HP	100HP	100HP	100HP	125HP	125HP	125HP
80,000	**84"**	**72"**	**60"**	**60"**	**60"**	**60"**	**60"**	**48"**	**48"**	**48"**	**48"**	**48"**	**48"**	**48"**	**48"**	**48"**
	10HP	20HP	30HP	40HP	50HP	50HP	60HP	75HP	100HP	100HP	125HP	125HP	125HP	125HP	125HP	150HP
90,000	**84"**	**72"**	**72"**	**60"**	**60"**	**60"**	**60"**	**48"**	**48"**	**48"**	**48"**	**48"**	**48"**	**48"**	**48"**	**48"**
	15HP	25HP	30HP	50HP	50HP	60HP	75HP	100HP	100HP	100HP	125HP	125HP	125HP	150HP	150HP	150HP
100,000	**84"**	**72"**	**72"**	**60"**	**60"**	**60"**	**60"**	**60"**	**60"**	**48"**	**48"**	**48"**	**48"**	**60"**	**60"**	**60"**
	15HP	25HP	40HP	50HP	60HP	75HP	75HP	100HP	100HP	125HP	150HP	150HP	150HP	150HP	200HP	200HP
125,000	**96"**	**84"**	**72"**	**72"**	**72"**	**60"**	**60"**	**60"**	**60"**	**60"**	**60"**	**60"**	**60"**	**60"**	**60"**	**60"**
	15HP	30HP	50HP	60HP	75HP	100HP	100HP	125HP	125HP	150HP	150HP	200HP	200HP	200HP	200HP	250HP
150,000	**117"**	**96"**	**84"**	**84"**	**72"**	**72"**	**72"**	**72"**	**72"**	**60"**	**60"**	**60"**	**60"**	**60"**	**60"**	**72"**
	20HP	40HP	60HP	75HP	100HP	100HP	125HP	150HP	150HP	200HP	200HP	200HP	250HP	250HP	250HP	250HP
175,000	**117"**	**96"**	**96"**	**84"**	**84"**	**72"**	**72"**	**72"**	**72"**	**72"**	**72"**	**72"**	**72"**	**72"**	**72"**	**72"**
	20HP	50HP	60HP	100HP	100HP	125HP	150HP	200HP	200HP	200HP	250HP	250HP	250HP	300HP	300HP	300HP
200,000	**117"**	**117"**	**96"**	**84"**	**84"**	**84"**	**84"**	**72"**	**72"**	**72"**	**72"**	**72"**	**72"**	**72"**	**72"**	**72"**
	25HP	50HP	75HP	100HP	125HP	150HP	150HP	200HP	200HP	250HP	250HP	300HP	300HP	300HP	350HP	350HP
225,000		**117"**	**96"**	**96"**	**96"**	**96"**	**84"**	**84"**	**84"**	**84"**	**72"**	**84"**	**84"**	**84"**	**84"**	**84"**
		50HP	100HP	100HP	125HP	150HP	175HP	200HP	250HP	250HP	300HP	300HP	300HP	350HP	350HP	400HP
250,000		**117"**	**117"**	**96"**	**96"**	**96"**	**96"**	**84"**	**84"**	**84"**	**84"**	**84"**	**84"**	**84"**	**84"**	**84"**
		60HP	100HP	125HP	150HP	175HP	200HP	250HP	250HP	300HP	300HP	350HP	350HP	400HP	400HP	450HP
275,000		**117"**	**117"**	**117"**	**96"**	**96"**	**96"**	**96"**	**84"**	**84"**	**84"**	**84"**	**84"**	**84"**	**84"**	**84"**
		75HP	100HP	125HP	175HP	200HP	250HP	250HP	300HP	350HP	350HP	400HP	400HP	400HP	450HP	450HP
300,000		**117"**	**117"**	**117"**	**117"**	**117"**	**96"**	**96"**	**96"**	**84"**	**84"**	**84"**	**84"**	**96"**	**96"**	**96"**
		100HP	100HP	150HP	175HP	200HP	250HP	300HP	300HP	350HP	400HP	400HP	450HP	450HP	450HP	500HP
350,000			**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**96"**	**96"**	**96"**	**96"**	**96"**	**96"**	**96"**
			150HP	175HP	200HP	250HP	250HP	300HP	350HP	400HP	450HP	450HP	500HP	500HP	600HP	600HP
400,000				**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**96"**	**96"**	**96"**	**117"**	**117"**	**117"**
				200HP	250HP	300HP	300HP	350HP	400HP	450HP	500HP	600HP	600HP	600HP	600HP	700HP
450,000					**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**
					300HP	350HP	350HP	400HP	450HP	500HP	500HP	600HP	600HP	700HP	700HP	800HP
500,000						**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**	**117"**
						400HP	450HP	450HP	500HP	600HP	600HP	700HP	700HP	800HP	800HP	900HP



JEFFREY TYPE 8 H AERODYNE MINE FAN

The Jeffrey Aerodyne (Patent Pending) will maintain static efficiencies well over 80% when working over a wide range of duties. It is ideally suited to limited space installation, provides high pressures, saves power, and is reversible by merely changing direction of motor rotation.

Study these advantages:

HIGH CAPACITY—for specified pressures and efficiencies the Aerodyne fan produces the greatest air volume possible, either theoretically or practically.

QUIET OPERATION—for any required duty the fan operates with the lowest tip speed consistent with good efficiency.

FLEXIBLE—the adjustable blade feature (see photo of blades in color) allows quick and positive blade adjustment without the aid of gauges or factory assistance.

EFFICIENT—designed to maintain high static efficiencies over the widest possible range of operating conditions.

YEARS OF EXPERIENCE—by building the majority of mine fans of many diversified types since 1907, Jeffrey has gained experience and knowledge unparalleled by any other company.

Let us send you additional information.

The Jeffrey Manufacturing Company

958-99 North Fourth Street COLUMBUS, OHIO

V25 I 12 DEC 39

Their WHEAT Cap Lamps' brighter, steadier light helps these men to get bigger output and avoid many accidents

Eastern & Mid-Western Bituminous Fields
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207 Investment Bldg., 239 4th Ave., Pittsburgh, Pa.

Western Bituminous & Metal Fields (including British Columbia)
E. D. BULLARD COMPANY
San Francisco, Calif.

Canada (except British Columbia)
H. C. BURTON & COMPANY
Hamilton, Montreal, Toronto, Swastika

WHEAT Electric Cap Lamps

Help Get Bigger Output . . . Fewer Accidents

Fading or flickering light from miners' cap lamps tends to hold down mine output; is apt to lead to costly accidents. For obviously the men cannot work as well handicapped by poor light—cannot detect danger signs as quickly.

Eliminate the disadvantages of poor light with WHEAT Electric Cap Lamps!

The WHEAT Lamp gives *brighter* light, and it's *steady*—does not fade or flicker. Its volume of illumination is practically constant to the end of the shift.

Experience shows that WHEAT'S brighter, steadier light is an important factor in securing greater tonnage per man-day, cleaner tonnage, and fewer accidents. That is why more and more mines are installing WHEAT Electric Cap Lamps.

It will pay you to investigate the WHEAT Lamp's numerous advantages.

For Full Information Fill Out and Mail the Coupon

KOEHLER MANUFACTURING COMPANY MCJ 12-39.
Marlboro, Massachusetts, U.S.A.

Without any obligation on my part, send complete information on WHEAT Electric Cap Lamps.

Name..... Title.....

Company.....

Address.....

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Write for bulletin No. 153

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I-T-E

LOAD DISTRIBUTOR for Motor-Generator Sets

The Type LDR Load Distributor is now improving motor-generator set performance in some of the leading operations in the mining industry.

Used with motor-generator sets operating in parallel in the same trolley and feeder system, the Load Distributor keeps the generator nearest the load, with its comparatively higher voltage, from taking more than its share.

ADVANTAGES

1. **Balances Substation Loads**
2. **Reduces Breaker Outages**
3. **Limits Overload Peaks**
4. **Prolongs Armature Life**
5. **Lessens Commutator Burning**
6. **Lowers Capacity Requirements**
7. **Maintains Better Service**

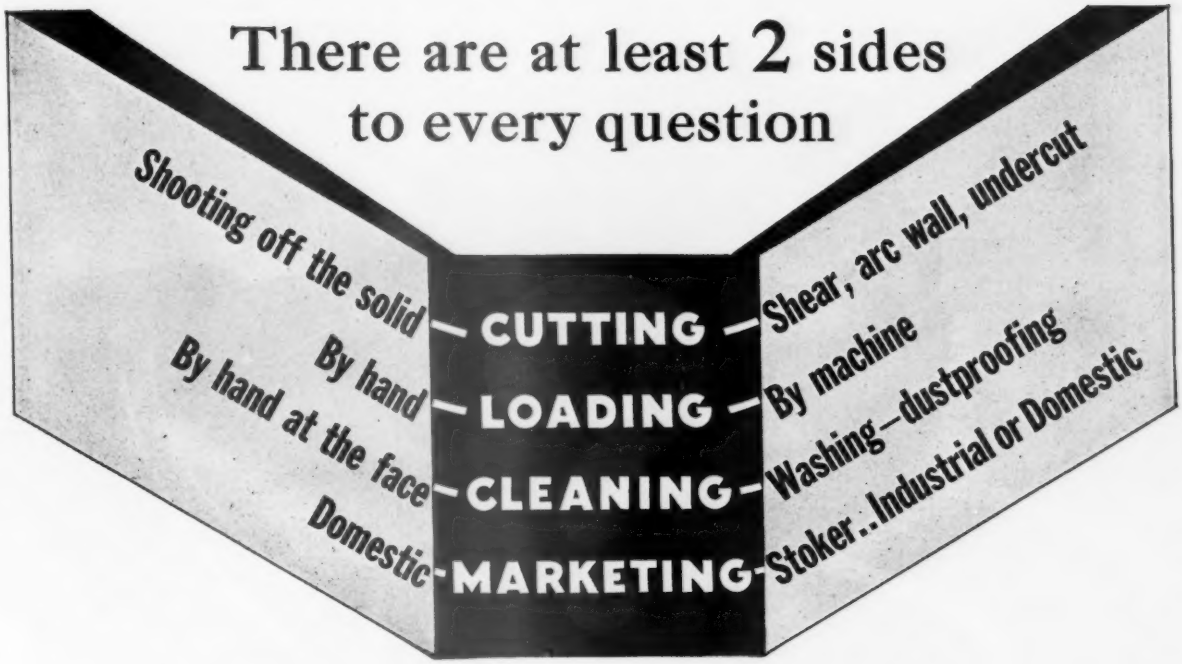
Bulletin 3904 describes the I-T-E Load Distributor and includes charts from actual mining installations.

At right above—The Load Distributor mounted on a 16" x 19" panel. can be installed quickly in the positive generator circuit. A glass panelled, dust proof cover protects the mechanism.

Representatives in Principal Mining Areas

I-T-E CIRCUIT BREAKER CO.
PHILADELPHIA, PA.

There are at least 2 sides to every question



. . . and the answers make a big difference in picking the right explosive!

If you undercut and shear, load mechanically, clean, wash and dust-proof your coal for industrial and domestic stoker markets—that's one thing. If you shoot off the solid, clean at the face, load by hand and sell lump to the domestic market—that's another.

All of these things, and many more, influence the type and amount of explosive charge. To meet these highly technical problems, Atlas has developed many types of explosives for coal blasting. There are some 30 grades of Atlas Explosives used in mining coal. Atlas Explosives offer an unusually wide choice for effective and economical blasting. There is money saved by using the right one for your particular mining job.

ATLAS POWDER COMPANY, WILMINGTON, DEL.

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EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

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A wire rope that reduces rope wear to a minimum—that provides maximum resistance against fatigue—Roebling "Blue Center" assures maximum rope operating economy. It is the highest achievement of Roebling's over 90 years of rope making experience! Ask about this rope—either standard or preformed.

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BRANCHES IN PRINCIPAL CITIES

STRONGER—Wire of highest strength consistent with ductility and toughness

TOUGHER—Provides maximum resistance against wear, sudden shocks, vibration

SAFER—Unequalled for uniformity of quality

SAVING—Insures lowest general average operating cost

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MINING CONGRESS JOURNAL

Vol. 25 DECEMBER, 1939 No. 12

Although the ringing strains proclaiming the birth of the Prince of Peace may sound hollow in war-torn Europe and Asia during the coming Christmas Season, we in the Americas, except for our good neighbor to the north, may still rejoice that this suffering and misery are spared us.

The staff of Mining Congress Journal are happy to wish its readers the merriest kind of Christmas, and to join in the fervent prayer that "Peace On Earth, Good Will Toward Men" may continue in this hemisphere and soon return to the rest of the world.

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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Not A Moot Question

WHETHER two billions of dollars shall be raised by additional taxes for national defense or whether such amount shall be borrowed, is said by President Roosevelt to be a moot question, and in this nation seems to be in accord. Another moot question is whether the amount raised for such purpose shall be two or two billion three hundred million dollars.

It seems to be assumed without question that some enormous sum must be provided for emergency national defense. Adequate defense appropriations are essential and justified. Three hundred million dollars in itself is not a small sum. Whatever is needed to keep abreast of requirements should be provided, but that this nation shall be stampeded to provide exceptionally large armaments to meet situations which may never exist does not at this time seem justified.

A few years ago we were scrapping armament. Now we seem ready to peril our domestic prosperity by additional unbearable tax burdens for armament which at that time seemed a menace to world peace.

What are the facts upon which this armament hysteria is based?

Great Britain and France are at war with Germany. Opinion throughout this country holds that without question the Allies will win the war. The aim of the Allies as stated by Prime Minister Chamberlain is:

> "To defeat our enemy and by that I do not merely mean the defeat of the enemy's military forces; I mean the defeat of that aggressive, bullying mentality which seeks continually to dominate other peoples by force, which finds a brutal satisfaction in the persecution and torture of inoffensive citizens, and, in the name of the interests of the state, justifies the repudiation of its own pledged word whenever it finds it convenient. . . .
>
> "That is our war aim and we shall persevere in this struggle until we have attained it. . . .
>
> "Our desire, then, when we have achieved our war aims, would be to establish a Europe with a new spirit in which the nations which inhabit it will approach their difficulties with good will and mutual tolerance.
>
> "In such a Europe *armaments would gradually be dropped as a useless expense,* except insofar as they were needed for the preservation of internal law and order."

If the Allies succeed in this undertaking, then any additional expense by this country for war purposes at this time is highly inadvisable.

By doing this we would increase discontent among our own people by swelling tax loads already too burdensome; and absorb wealth the use of which is absolutely necessary to provide work for our great army of unemployed. We would thus be breaking down our chief line of defense. A healthy, happy, patriotic, debt-free nation is the best protection against war, and when war is inevitable it is the best preparation for its effective prosecution.

A nation honey-combed with Kuhns, Browders and Bridges, is weak, no matter what the state of its war defenses. No nation can entirely protect itself against sabotage. Parlor-pink Socialists furnish a respectable kindergarten for the training of weak minds for more advanced studies in the philosophy of unrest, communism and anarchy.

Each of these is fertile soil for the recruiting of agitators and saboteurs. A very few of these pretended patriots can, by being properly located, nullify to a large extent the advantages not only of what we have but of what we propose to get by increasing the burden of taxation which even now is a serious handicap to enterprises providing employment.

The keynote of national defense is a satisfied, employed, prosperous people. Senator Borah is quoted as properly saying, "You can destroy the citizenship of a country, its morale and its worth almost as effectively through taxation as you can through war." Taxes are paid not from wealth but from that part of wealth which is fluent—from currency. When we propose, as we now do, to increase a tax which already consumes one-third of our fluent earnings we are laying the foundation for further unemployment, for unrest and mutiny.

To offset partial unemployment, now less than 25 percent, we have increased our national debt nearly thirty billions, the interest on which is nearly a billion dollars annually, and now we propose to increase this already threatening burden to meet an imagined danger created by European unrest. We are keeping out of war, but we are burdening our prosperity with a large part of the costs of war. This waste in turn will breed unemployment and a breaking down of morale which is the most important line of national defense.

Are we as a nation properly described by Shakespeare as the "lightness of you common men" whom he says, "Obey my wind when I do blow and yield to another when it blows?" Are we, as in 1916, to allow a shallow propagandized public clamor to drive us into the expenditure of billions of dollars for armaments which Mr. Chamberlain says, "would gradually be dropped as a useless expense?" In the opinion of the writer there is but one intelligent answer to that question.

A JOURNAL FOR THE ENTIRE MINING INDUSTRY—PUBLISHED BY THE AMERICAN MINING CONGRESS

MINING CONGRESS JOURNAL

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Richard J. Lund, Editor

COAL MINE EMPLOYMENT AND PRODUCTIVITY

EVERYONE interested in mechanization and employment in bituminous coal mining will find a wealth of pertinent information conveniently tabulated and discussed in a two-volume report by the National Research Project and Bureau of Mines, just off the presses.

This is another in the series of studies on the general subject of reemployment opportunities and recent changes in industrial techniques in mining and other industries—investigations which trace the history of employment, mechanization and productivity of employes over a period of years, analyze the results and endeavor to predict future trends, all leading up to what the sponsors hope will be a more intelligent approach to the unemployment problem.

This 436 page report dealing with bituminous coal mining reflects much credit on the undertaking. There are probably few major industries having as complete an annual statistical record as does coal mining, so that the story is remarkably clear. However, even the coal figures have their limitations, and the authors have been careful to analyze possible sources of error in the results in an endeavor to make the information accord most closely with the facts.

Long-time trends of labor productivity in coal mining are summarized as follows:

(1) In the half-century covered by the record, output per man per day has increased twofold to threefold.

(2) The increase has been gradual. It is the result of a continuing process of technical evolution rather than of sudden revolutionary change. Aside from short-time irregularities, the upward course of the output per man-day, when shown on a ratio scale, follows a straight line from 1880 to 1932.

(3) The chief cause of the short-time irregularities in daily output is found to be changes in the length of the working day. Most important of these is the universal adoption in 1933 of the 8-hour (and later 7-hour) day under the bituminous-coal code of NRA.

There are a few references to actual benefits accruing to labor through mechanization, such as:

"Technical progress has been a factor in aiding coal to meet its competitors in the market and offers one means of maintaining adequate wage rates and working conditions. . . . If the cost of coal is reduced, new uses found, and former markets recovered, mechanical loading will result in the elimination of much of the back-breaking work of coal mining without exacting too great a price in terms of unemployment and reduced income."

Predicting that within another decade as much as half of the total underground output may be mechanically loaded, and after pointing out the aid of technical progress in meeting competition of other fuels the report states, "No student of the coal industry, however, foresees a revival of demand such as to enable the industry to absorb any of the unemployed from other fields of labor. In fact, the most that can well be hoped for is to maintain the working force now employed at the mines."

NEW BUREAU OF MINES SERVICES

ANNOUNCEMENTS issued recently by the United States Bureau of Mines describe three new meritorious services being conducted by that agency. These comprise: (1) strategic minerals investigations in the field in accordance with provisions of the Strategic Materials Act; (2) monthly canvasses of production, consumption and stocks of strategic minerals, and (3) periodic surveys of dealers' and consumers' stocks and the rate of consumption of iron and steel scrap. All these relate directly to national defense—a vitally important subject at any time, but especially so during the present international crisis,—and are in keeping with the Bureau's announced policy of presenting timely factual data on strategic and highly essential mineral raw materials at this crucial time.

The celerity with which the strategic mineral exploration work has been carried on in the field is a credit to the Bureau. Incidentally, this has been effectuated in many areas only by widespread use of tractor bulldozers in such work as trenching previous to sampling; the speed and economy of this type of equipment for such use have been strikingly indicated.

All these services are worthy undertakings; industry should aid the Bureau by fullest cooperation so that the results will accord with this agency's consistently high standards.

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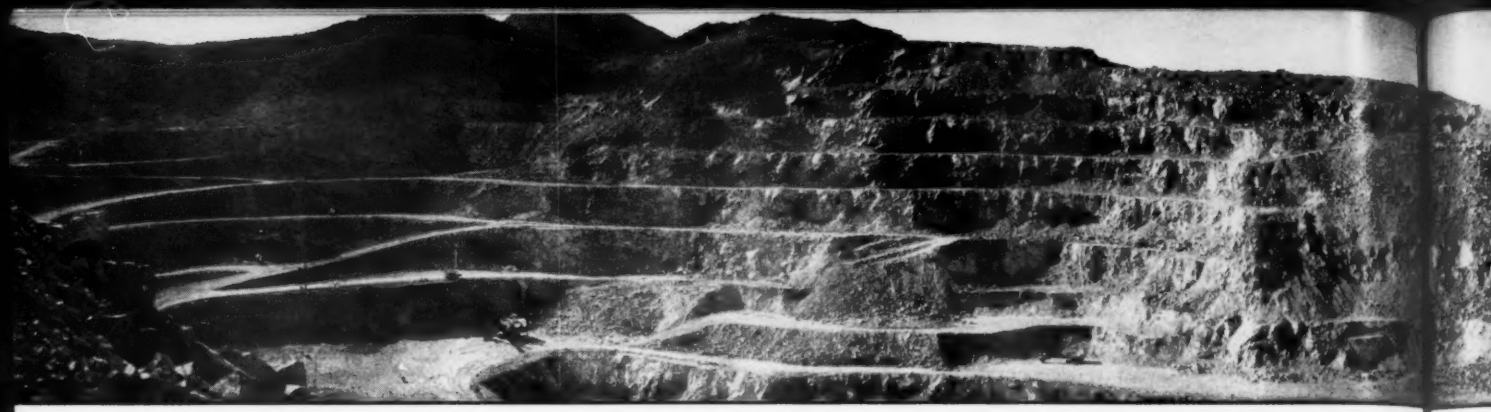

The new Morenci pit of Phelps Dodge Corp. as it appeared late this summer. Test pit ore for pre

Development of the MORENCI OPEN PIT*

● ***Work of Opening Up Largest Metal Mining Project in Decades is Proceeding According to Schedule. Two Years' Preliminary Stripping Yet to be Done***

By H. M. LAVENDER
Vice President and General Manager
Phelps Dodge Corporation

SEVERAL articles concerning the Morenci open pit program have previously appeared, and this paper is largely a condensation of material prepared by the Morenci operating personnel, to whom all credit is due for the data supplied. This discussion, however, has the merit of bringing up to date the progress made in preparing the Morenci project for initial production, and as a result has some additional facts to present.

Inasmuch as the project as originally outlined required the preliminary stripping of a large tonnage of waste material, the greatest amount of work to date has been done in stripping operations and in the construction of allied service roads and railroads, supplemented in 1939 by test mill operations. This discussion will, therefore, deal largely with these specific operations, touching only in general upon the future construction program, which is dependent in a large degree upon the results of the test work still being conducted.

History of the Morenci District

From available records it appears that the first production of copper near the area that is now being developed at Morenci was made in the year 1870. Eleven years later the Detroit Copper Company, later to become an integral part of Phelps Dodge Corporation, became interested in the district, and through a series of purchases and consolidations all major mining interests eventually became vested in Phelps Dodge Corporation.

The original mining, as in most of the early Arizona mining camps, was in the secondary enriched areas and replacement deposits that occurred in sedimentary rocks. With the exhaustion of these high-grade deposits, operations were gradually expanded into the monzonite porphyry, where enriched ore occurred in fissures and as disseminations in the porphyry. Mining in the porphyry deposits, while originally confined to the higher grade areas, eventually expanded into the lower-grade disseminated ores which were mined over a considerable period of time by various underground methods, block caving being the principal method used in late years. Through the exploratory and development work that accompanied these operations, it was realized at an early date that a large deposit of relatively low-grade porphyry ore existed adjacent to the higher grade areas. By means of underground workings, churn and diamond drilling, carried on over a period of many years, the existence of the low-grade porphyry ore body now known as the Morenci open pit was established.

Preliminary Engineering

The open pit deposit now being prepared for production consists principally of the copper mineral chalcocite disseminated in monzonite porphyry. It has been determined by diamond drilling, churn drilling and through underground development that there are 284 million tons of milling ore in this pit area, which will assay 1.036 percent copper. The gold and silver content of this ore is low. The open-pit layout provides for pit limits on a 1:1 overali slope, and is based on a grade cutoff and stripping ratio which it is estimated will permit the extraction of 230,000,000 tons of ore averaging 1.06 percent copper. The total amount of waste, both stripping and interior, which it is estimated must be removed, amounts to 239,000,000 tons. This will give a final ratio of 1.04 waste to 1.00 of ore. The maximum thickness of the barren capping is 500 ft., with an average

* Presented to Sixth Annual Metal Mining Convention and Exposition, American Mining Congress, Western Division, Salt Lake City, Utah, August 29, 1939.

present test mill operations comes from benches at left. Rugged character of terrain strikingly shown

thickness of 216 ft.; the thickness of the recoverable ore is 850 ft.

In order to provide for initial production at the projected rate of 25,000 tons per day, it is estimated that approximately 43,000,000 tons of preliminary stripping must be done. Stripping operations were started late in 1937 and continued on a small scale during 1938. To date the total amount of stripping that has been removed is approximately 13,000,000 tons. The present schedule calls for the completion of the preliminary stripping by January 1, 1942, which will require the removal of approximately 26,000,000 tons in the years 1940 and 1941.

As indicated in the above panorama, the topography near the pit area is extremely rough and mountainous and the initial development with railroad haulage offered many difficult problems. Further studies indicated that through the use of large trucks, waste from the early stripping operations could be made available for use in accordance with track construction plans, and that railroad construction would thereby be greatly facilitated.

Preliminary layouts for the use of these trucks restricted their operation to the actual development of benches in preparation for subsequent track building, and to the dumping of waste from this stripping to places where it would later be utilized as roadbeds for track construction. The flexibility of loading and dumping that has been experienced in this initial development has justified the choice of trucks, and it is more than likely that this would be true in any pit development of similar character. The experience at Ajo, where a combination truck and railroad haulage program is being conducted, makes it appear reasonable that in many operations an advantageous use of trucks can be made in connection with conventional haulage.

Pit plans were laid out calling for the establishment of 50-ft. benches, with bench widths of 100 ft. The bench width chosen will provide ample room for maintenance of haulage tracks, as well as room for blasting with churn drills and for shovel movements.

An additional consideration which influenced the location of preliminary stripping and the establishment of benches was the desirability of exposing at as early a date as possible a tonnage of ore sufficient to insure a test-mill operation at a rate of 1,500 tons per day over a period of one year. The ore thus exposed early in 1939 is now being mined by means of small Diesel-powered shovels and delivered to the test mill over adverse grades by means of 5-yd. trucks holding approximately 9 tons.

In addition to the disposal of waste for railroad fill and switchbacks, it was necessary to provide favorable dump sites located reasonably near the stripping operations. While the rugged topography of the country offered serious difficulties to the building of a railroad, this topography in itself was a favorable factor in providing

5-yard trucks are also in use

adequate dump room for waste and leach material. Dump sites were chosen for their proximity to the stripping operations, after establishing by means of diamond drilling that no economic ore would be covered by them.

Equipment and Preparatory Plans

In planning the mining operations, consideration was also given to the equipment that was to be used. For road construction, which involved many miles of roads to reach the different benches, many of which roads will in turn become part of the railroad switchback system, it was decided to use tripod air drills and bulldozers, and small Diesel shovels of ¾ to 1½-yd. capacities. For drilling and blasting operations on the 50-ft. benches to be established, churn drills using 9-in. bits, together with mounted toe-hole machines, were purchased. For the main loading operations, 4½-yd. electric shovels were specified for loading into 22½-yd. dump trucks during the period of trucking operations.

In order to get this equipment into Morenci, it was first necessary to

Part of fleet of 19 trucks used in stripping—capacity of each approximately 22½ cubic yards

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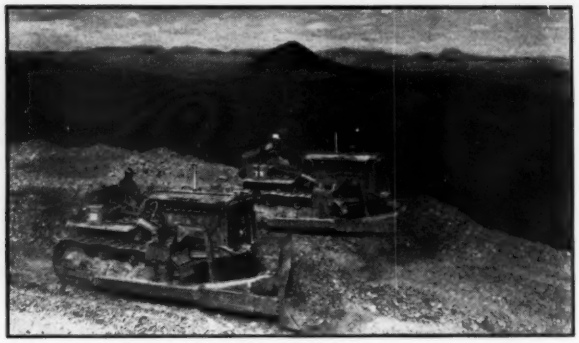


Bulldozers have been found indispensable in constructing roads and railroad grades. Here are two of a fleet of 10 at work at Morenci, powered by Diesel engines

standard gauge the existing narrow-gauge railroad line between Clifton and Morenci, some 11 miles in length, and to construct roads through the old town of Morenci of sufficient width to permit the transportation of the large equipment it was planned to use in the mining operations.

The usual water and air service lines were also provided for in the preliminary engineering plans.

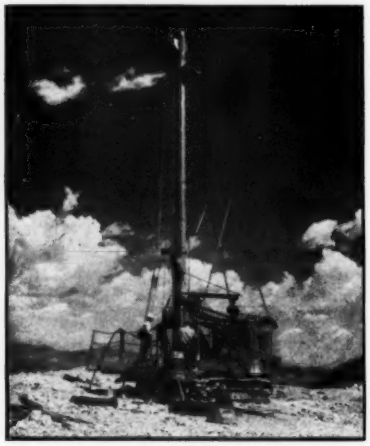
In addition to the purchase of the equipment actually needed for the immediate stripping operations, it was necessary to provide in or near the old town of Morenci additional housing, restaurant and clubroom facilities, which construction was carried simultaneously with the work in the pit.

Present operations at the Morenci open pit have been geared to a 5-year development program which calls for the removal of 43,000,000 tons of waste, and the operation of the test pit for the delivery of 500,000 tons of ore to a pilot mill at the rate of 1,500 tons per day. Now, in the second full year of production, a total of nearly 13,000,000 tons of material have been removed, the bulk of which has been used to make railroad fills. The construction of railroad fills has, therefore, made the stripping operation one that may be considered as construction work. For this reason the problems encountered and efficiencies obtained have not followed the usual standards of straight open-pit operation. Frequent changes in the location of shovel operations have been necessary in order to meet cut and fill requirements for railroad construction, the development of the test pit, and the work in connection with the preparation of sites for the construction and erection of the many proposed buildings.

Following is a resume of the mining practices as now conducted:

Breaking Ground

Primary drilling is performed by churn drills and air drills. Inasmuch as in the preliminary establishment of benches and roads much side-hill work was necessary, the use of air drills in preliminary preparation of both roads and benches was necessary. This was followed by the use of churn drills wherever the set-up was deemed advantageous. Air drills were found to be more efficient than churn drills when drilling holes less than 24 ft. in depth, and this largely determined the



9-in. churn drills mounted on caterpillars for mobility are used in drilling on 50-ft. benches

choice of equipment in the preliminary drilling. After the establishment of benches of approximately 50 ft. in height, churn drilling was used exclusively, except for secondary breaking and a minor amount of toe holing. Churn drill holes are spaced on the regularly established benches at a minimum of 12 ft. from the crest and 12 ft. apart, varying to a maximum of 15 ft. from the crest and 15 ft. apart. In so far as possible, benches are cleaned and toes blasted out by means of air drills to provide a bank as nearly vertical as possible for primary blasting. By so doing, the guesswork as to the burden carried by each drill hole has been eliminated to a substantial degree by the use of surveying instruments, and the actual burden has been calculated in order that powder charges may be adequate. This has, to a large extent, eliminated overshooting and undershooting, and has provided uniform blasting throughout.

The ground at the Morenci pit is considered medium hard in character, although, as is usual in pit operations, there are many gradations in the hardness encountered in different localities. For the average ground, ammonium nitrate, granulated, free-flowing powder, having a strength of 40 to 60 percent, and a velocity of 6,500 ft. per second, has been found to be the cheapest and most effective powder. This powder is at all times primed with a 12½-lb. cartridge of gelatin having a strength of 40 percent and a velocity of 9,000 ft. per second. The detonator used for primary blasting is primacord, which has a velocity of 21,000 ft. per second.

Loading

The standard shovel in use at the Morenci open pit is a full revolving electric power shovel operating on 2,300 volts, equipped with either a 4½ or 5½-yd. dipper. Main power lines coming to the pit carry 13,000 volts, and this voltage is stepped down to 2,300 volts at substations located as near as possible to the loading operations. A shovel crew consists of three men—runner, oiler, and pit man.

A regular operation using trucks consists of an electric shovel, a bulldozer, and sufficient trucks to provide for full-time operation of the shovel.

Haulage

Primary haulage is performed by trucks of 22½-yd. capacity, initially powered by gasoline engines. The total weight of truck and load, all on pneumatic tires, is in the neighborhood of 60 tons. The average haul at the present time is around 4,300 ft. Since much of this is over grades averaging 10 percent, the truck service is of the most severe type. It has been found necessary when operating long distances over the severe grades which are encountered in the disposal of waste for railroad fill purposes, to water-cool the rear drums of these trucks.

One of the marked improvements that has been noticed in the trucking operations since the start has been the increase in serviceability of tires. This is a most important item of cost, as a set of tires, consisting of 10 to a truck, exclusive of inner tubes, costs in the neighborhood of $2,000. Through the cooperation of the manufacturers of these tires, the average life has been increased from 8,000 miles in 1937 to 13,000 miles in 1939.

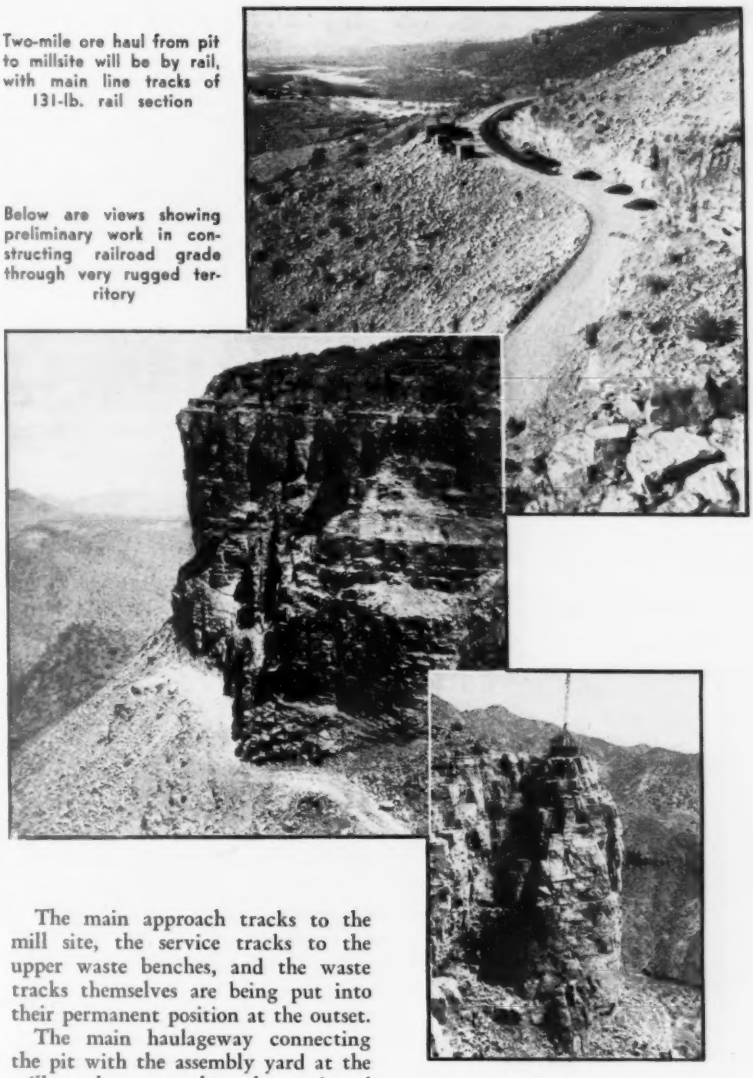
When the trucks were purchased consideration was given to the possibility of using Diesel engines, owing to the economies they offered in fuel consumption. However, at that time no manufacturer would guarantee their performance, and so the use of gasoline engines was decided upon. Of late, the advance in the design and the economies of the Diesel engines have been so marked that replacement of worn-out gasoline engines with Diesel units of greater horsepower is now under way. This has resulted in a marked gain in the operating efficiency of the trucks so equipped. This is accomplished mainly through greater availability and lowered fuel costs, together with higher speed resulting from the increased horsepower of the Diesel engine. It might be added that the trucks as originally delivered have been greatly modified in design as a result of the severe service to which they have been subjected over the past years, and breakdowns due to structural weaknesses have been considerably reduced.

Railroad Haulage

Following the first operations involving the exclusive use of dump trucks, the mine will gradually be converted to railroad haulage, except for the uppermost benches, where waste disposal is particularly adapted to the use of trucks. The transportation system has been laid out so that 85 percent of all material to be mined will move over flat or favorable grades. The average length of ore haul between the pit and the mill assembly yard will be about 2 miles, of which approximately 1 1/3 miles will be over a 0.4 percent grade. The upper ore benches of the pit will be reached over a series of switchbacks with a maximum grade of 4 percent, compensated for curvature. Tracks to the waste dumps will be over 0.2 percent grades. About one-half of the total stripping will move over track built especially for the handling of waste in a direction directly opposite from the ore movement.

Two-mile ore haul from pit to millsite will be by rail, with main line tracks of 131-lb. rail section

Below are views showing preliminary work in constructing railroad grade through very rugged territory



The main approach tracks to the mill site, the service tracks to the upper waste benches, and the waste tracks themselves are being put into their permanent position at the outset.

The main haulageway connecting the pit with the assembly yard at the mill crushers cuts through a series of high, precipitous, quartzite cliffs. A preliminary line with 30° curvature has been carved into the cliffs, and this will later be realigned into permanent position by dumping mine waste from railroad cars. The deep canyons encountered between the pit area and the mill site are being filled by the big dump trucks, which reduces the excavation for railroad alignment to the sharp protruding ridges.

Main-line tracks are being laid with 131-lb. rail sections on 8 x 10-in. creosoted ties. Permanent service switchbacks and dump lines are 90-lb. steel on 7 x 9-in. creosoted ties. Bench and dump tracks will be 90-lb. rail section on 7 x 9-in. untreated native pine ties.

Ore trains will be made up of a locomotive and gondola-type ore cars, with a dumping tipple in use at the crusher. The dead weight of this type of car is approximately 23 tons, and each will have a capacity of 100 tons of ore.

Waste trains will consist of a locomotive and self-dumping, drop-door, 30-cu.-yd. waste cars. The use of anti-friction bearings in mine-car equipment is being investigated.

During initial train operations, which will be confined to the movement of waste over waste tracks on a favorable grade of 0.2 percent, Diesel electric locomotives will be used. Depending upon the performance of these units, a decision will be reached as to whether the expansion will be continued with Diesel electric or trolley electric locomotives.

The accompanying cut shows the type of locomotive which has been

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High scalers at work on precipitous quartzite cliff along railroad grade

purchased, now undergoing trial at the New Cornelia Branch. These units are 1,000 hp., sea-level rating, and weigh approximately 125 tons each.

Test Mill Plans and Operation

Simultaneously with preliminary open pit, railroad and initial plant engineering studies, laboratory test work was conducted on representative ore samples produced by underground mining methods. Owing to the large percentage of copper material occurring in the chalcocite range, with a resultant relatively high oxide content, early tests were conducted to determine the comparative merits of a ferric sulphate leach and concentration by flotation. A 50-ton leaching plant, incorporating electrolytic precipitation, and a 100-ton flotation unit were constructed and operated in the years 1929 to 1931, inclusive. These test operations and subsequent laboratory flotation test work resulted in the decision to treat the Morenci open-pit ore by concentration using flotation.

The advance in the art of flotation, and improvements in crushing, grinding, classifiers and flotation units since the test work on Morenci open-pit ore was last conducted, made it desirable that the entire problem again be reviewed in order that the final flowsheet for the crushing plant and concentrator could be predicated upon the latest results in machinery and flotation practice, as developed by large-scale tests on the Morenci open-pit ores.

Unusual opportunities existed at Morenci to secure the required information on a relatively large-scale test basis. Stripping plans permitted production at an early date by open-cut methods from a typical section of open-pit ore. Studies also indicated that the operation of one section of the old Morenci concentrator as a test unit was entirely feasible. A section of the concentrator was reconditioned, provision being made for the installation and trial of different types of machinery and for conducting metallurgical experiments to test and prove this machinery under actual operating conditions. This test unit has been operating since April, 1939, at a rate of approximately 1,500 dry tons per day, the ore being transported from the test pit to the mill crushing plant in 5-yd. trucks.

Present plans calls for the operation of this test section during the remaining months of 1939 at approximately the present tonnage rate, thus allowing the combined metallurgical and equipment problems to be definitely determined. The final mill and concentrator design will be largely based upon the results secured from the treatment of approximately 450,000 tons of pit ore.

Smelter

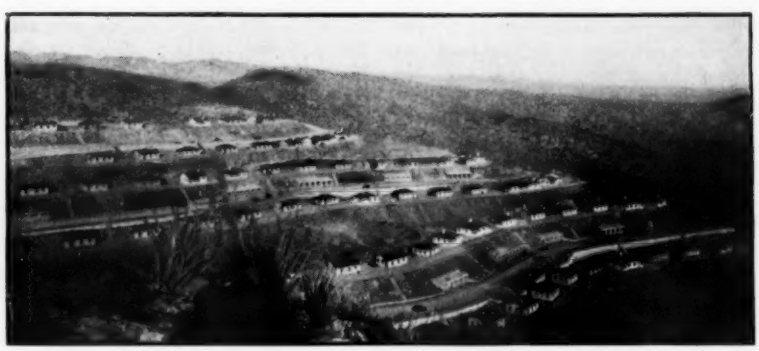
The material smelted at Morenci, except for the necessary flux ores and a small amount of precipitate copper, will be flotation concentrates. Preliminary plans for smelter design indicate the desirability of using a wet charge method for the smelting of these concentrates.

At the present time, Morenci concentrates from the test mill, amounting to about 2,500 tons per month, are being bedded and treated separately at the Douglas smelter, where it is possible to smelt these concentrates by wet charge methods under conditions identical with those anticipated in the Morenci operation. In addition to the wet charging of flotation concentrates, separate converting and casting of anodes is being carried on at Douglas, and, as a result, data are being assembled upon which the design of the Morenci smelter may be based.

1,000-Hp. Diesel-electric unit hauling train of six 30-yd. cars equipped with axleless trucks and roller bearings. Use of units such as this will be confined at first to moving waste on favorable .2 percent grade—results will determine whether or not to expand their use or go to trolley electric units

Power Plant

Arrangements have been made for supplying Morenci with natural gas from the New Mexico fields. This will be the source of fuel used in



Townsite development at Morenci, showing houses for employes. A considerable increase in employes will be necessary during plant construction period

smelting and power-plant operations.

Power-plant studies are closely allied with the smelter experimental results, inasmuch as a large amount of waste-heat steam from reverberatory operations will be available for power production. For this reason, the problem becomes one of using to the greatest advantage both the relatively large amount of power that will be generated by waste-heat steam production and also the additional power necessary to supply plant demands which will be generated by separately fired boilers.

The results of smelter runs on Morenci concentrates will be used in the final determination of the design of the power plant.

Plant Site and Location

The site chosen for the location of crushing plant, concentrator, power plant, smelter, smelter machine shops and other buildings necessary to the operation of the plant is located approximately 2¼ miles from the Morenci open pit. The area selected provides sufficient room for all units to be erected under the present program, with ample space available for future expansion.

In the canyons located below the plant site, room sufficient for the disposal of 300,000,000 tons of tailings is available. All tailings will be delivered by gravity from the concentrator.

Present plans call for the completion of the Morenci plant by January 1, 1942, with provision for an initial capacity of 25,000 tons per day. Consideration is given in the location of each unit for such future increases in capacity as may be deemed advisable.

Factors for and Against Safety

● ***A Night Mine Foreman Gives Some Pungent Suggestions***

By WARD PADGETT
Night Mine Foreman
Crescent Coal Co.

WHEN we consider the many factors that enter into the proper or improper performance of our work we are considering those that enable us to escape injury according to whether we are properly or improperly performing our work.

It is not my intention to tell you the particular manner in which a job should be done, but to express in some measure my idea of what the attitude of every man should be toward his work and his fellow workers.

Everyone connected with mining, from trapper boy up, must become *danger-conscious* and *safety-minded*, before accidents will cease to occur.

Prime factors in the safety movement are interest, cooperation, coordination and accuracy.

Interest naturally takes precedence—without it none of the others follow.

Interest in our work makes the difference between drudgery and opportunity—maybe not opportunity to get rich or to do the spectacular, but opportunity to render service—to our families—to fellow workers—to our employers—and to the nation.

Make no mistake, our work, however humble is important—lack of interest in that humble job might foster carelessness, which could deprive someone of life.

Interest brings about cooperation, for we will realize that cooperation is necessary to the proper performance of related jobs, and proper performance is safe performance.

Constructive cooperation brings about coordination—the bringing into harmonious relation the various functions and operations that go to make a complete whole.

Coordination brings forth accuracy—accuracy of movement, accuracy in halting movement at the desired point—in giving orders—in giving reports—in giving information. And, too, we must be punctual—not only in getting to work on time, but starting each separate yet composite part of the day's work on time and finishing it on time.

So with interest—cooperation of men—coordination of operations—accuracy acquired—and punctuality a quality, injuries and fatalities will be reduced to the minimum.

They are factors for safety. Lack of them are factors against safety.

Why should men be crippled or killed by known dangers? You may argue that one can't tell when rock will fall. But we can tell when it won't fall—when it is properly and adequately timbered. We know that gas and dust are potential killers. We know that powder and dynamite are intended to explode. We know that defective track has caused death through wrecks.

We know that wrongly placed or unguarded wiring has caused electrocutions—that poor insulation and defective bonding has caused fires. These hazards and others are recognizable, and the knowledge and ability required to remove them can usually be found in the mine where they exist.

Thousands of men have been killed in coal mines, thousands more have been crippled, and if we could see back of those accidents and look upon the contributary causes I imagine it would be a shocking revelation. We are spared that shock; but could it occur, the improvement in the attitude of many, the renewed zeal of all, toward the safety movement, it would be a glorious thing for humanity.

Accident—the killer and crippler of men; the dread of management; the destroyer of property—brings deprivation to children and sorrow to women.

Safety—the aim of every conscientious manager; the hope of every miner; a blessing to every child; the theme of every prayer of wives and mothers.

Let's make it a reality.

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Steel Roof Supports for Mechanical Loading in Western Pennsylvania

● ***Greatest Savings Found in Increased Mining Efficiency in Wide Places, Allowing Machines To Be Used Most Advantageously With Assured Safety***

By G. B. SOUTHWARD
Mechanization Engineer
American Mining Congress

ONE of the serious difficulties encountered in the application of mobile loading machines to mines with tender or bad top is the method of the roof support. Where excessive timbering is needed to insure safety at the immediate working face, the posts often cause interference to the loading, and also cause loss of time from placing and resetting the timbers as the loading progresses along the face.

A mine operated by one of the large western Pennsylvania coal producers in the Pittsburgh seam, as described in this article, has found that the use of light steel cross beams has provided a free loading space for the machine and through the time-saving thus effected, there has been a marked increase in operating efficiency and in tonnage produced. At this mine, experimental work with mechanical loading has raised production from 500-550 to nearly 800 tons of clean coal in three shifts per day, using a universal cutter and one tractor mounted mobile loading machine.

Seam Conditions

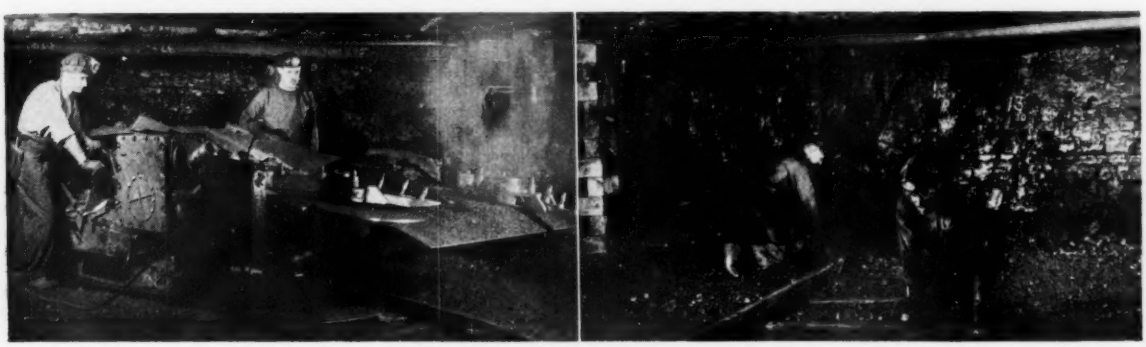
The Connellsville area of the Pittsburgh seam has been worked ever since the iron and steel industry developed west of the Allegheny Mountains, as it was early found that this seam furnished a highly satisfactory coal from a metallurgical point of view. Precautions must be observed, however, to avoid roof falls during extraction. This seam is overlaid by its characteristic draw slate, a 1-ft. seam of high sulphur "wild coal," and a 4-8-ft. layer of shale that decomposes rapidly upon exposure to the air. Above this is the sand rock, which in some sections is badly slipped. This supports the cover which varies in thickness.

Block System Used in Extraction

Early mining operations in this field used the room and pillar system, but some years ago a modification of this method was devised to suit the local roof conditions. The mining plan, which later became known as the "Block System," uses narrow rooms and wide pillars, so that the largest proportion of coal in the panel is mined from the pillars instead of the rooms. This affords a high percentage of recovery and holds roof difficulties to a minimum.

The mine described in this article works these pillars by open end faces, as shown in Fig. 1. When the open end system was first started, coal was blocked out in 112-ft. by 60-ft. blocks. Since the practice of making the first cut with a 45° angle at the entry side was inaugurated, however, it has been found more efficient to operate on 112-ft. by 75-ft. center blocks.

Work in this mine was begun about 12 years ago on a hand rib line, using places about 10 ft. wide. The practice is to leave 8-10 in. of coal on the roof with 0-6 in. on the floor. The machines were started about three years ago on an open end room mining system, working 18 ft. instead of 10 ft. wide places and cribbing the gob side. This practice was soon discontinued, as unsafe roof conditions developed.



Steel timbers give ample clearance for mine operations

Next, a practice leaving a 9-ft. rib of coal next to the gob was tried, driving a 10-ft. place and bringing the 9-ft. rib back in 20-ft. lifts. Roof timbers were set diagonally across the 20-ft. lift in the 10-ft. places. However, it was found that the 9-ft. coal rib on the gob side would not crush and allow the roof to bend, with the result that roof cracks developed in the 10-ft. places, so that system was abandoned.

The next stage in the development was to drive an 18½-ft. place, leaving approximately 18 in. of fender coal on the gob side to keep the slate from mixing with the coal loaded by the mechanical loader. Oak cross beams 4 in. by 8 in. by 16 ft. were set across the face to protect the men and the machines. Production was increased, but timber costs were too high, as the beams showed a tendency to crush over the pit posts supporting them, and could seldom be used more than once.

Steel I-beams were then used instead of wooden timbers, using two 3-in. I-beams welded together to form a double beam 3 in. deep and 5 in. wide. These beams were 18 ft. long and were set across the face. The cutter bar angled up slightly under the face beam to secure maximum coal recovery. Additional beams were set as the face advanced.

To facilitate moving the machines, the next stage in the development was to angle in the first cut off the entry at about 45°, installing a 5-in. steel H-beam 20 ft. long across the entry cut, followed by a 3-in. double I-beam at each 8-ft. cut (Fig. 2). This general practice of timbering is still in force, although several changes have been made in the type of steel room timbers. Experimental work, however, is being continued.

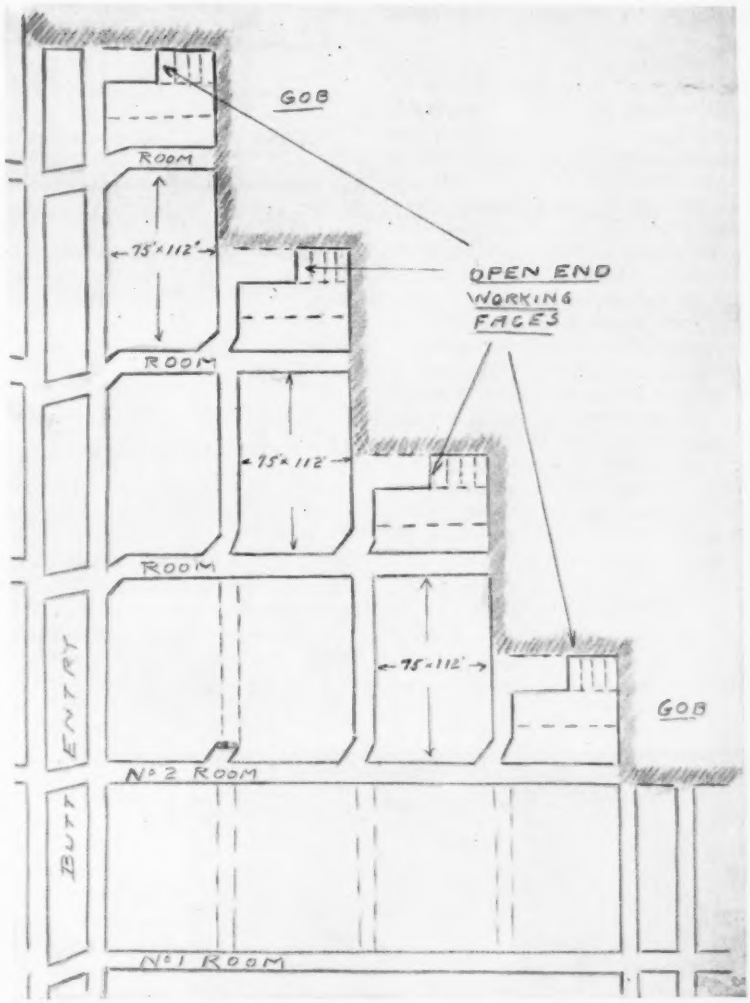


Fig. 1. General mining plan, showing pillars being worked by open end faces

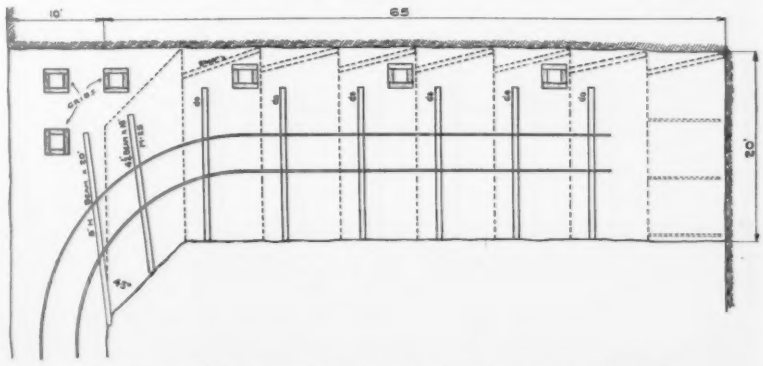


Fig. 2. Detailed mining plan, showing track, timbers and machine cuts

Present Practices Outlined

Present practice is to make the bottom cut first, then the top cut angling up under the face beam, and finally shear the gob side. This practice avoids trouble caused by the blast blowing coal into the gob and wasting force in roof cracks, and assures that a solid fender will remain after the shot. On this shear a wedge of fender coal is allowed to remain, 18 in. wide at the face and tapering to a point at the rear end next to the gob. (See Fig. 2.)

The overburden of the 20-ft. place and immediate coal is cantilevered from the unmined coal behind the room. Cribbing erected at the point of the fender coal wedge along the fall line, together with the pit posts supporting the room timbers, carries the sag. As soon as the angle cut from the entry has been loaded out, 18-ft. steel room timbers are set. Under normal conditions, a steel timber is used at the face with each cut, but where roof conditions are bad a second timber is set between the machine and the face.

Coal is shot from three drill holes, each hole being charged with three sticks of permissible explosive to give

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a full charge of 24 oz. In the 20-ft. places 40-50 tons of coal are loaded out from each cut.

Timber costs in the 20-ft. places are less than twice those for 10-ft. hand-worked places. Comparable material costs are approximately the same at present, but labor costs have been substantially reduced. Continued re-use of the steel timbers is, however, steadily reducing the timber costs. The greatest savings, however, come from the increased efficiency of the machines and the high production per place, the 50 percent saving in time lost by tramming being particularly noticeable in increasing production. Fast mining is essential to the successful operation of this open end system of retreat mining, particularly with wide places, and in the mine under discussion less than two days are required to drive a 20-ft. place through the 65-ft. block as against at least eight days if hand loading was practiced.

Steel Timber Details

Three different sizes of steel room timbers are now being used, and one flanged channel section, as shown in Fig. 3. These timbers, made by Carnegie-Illinois Steel Corporation, are set with the wide flange on top, thus providing maximum steel in compression in the wide top flange. Additional strength and stiffness is provided over the pit posts by welding on ¼-in. plates between the flange toes as indicated. Similarly, the channel, or "plug hat" section, which has a double web and is consequently more resistant to crushing and rolling under eccentric loading, may also be reinforced by welding on bearing plates at the ends or using hard wood plugs and lacing the lower face with straps to hold the bottom flanges permanently in position.

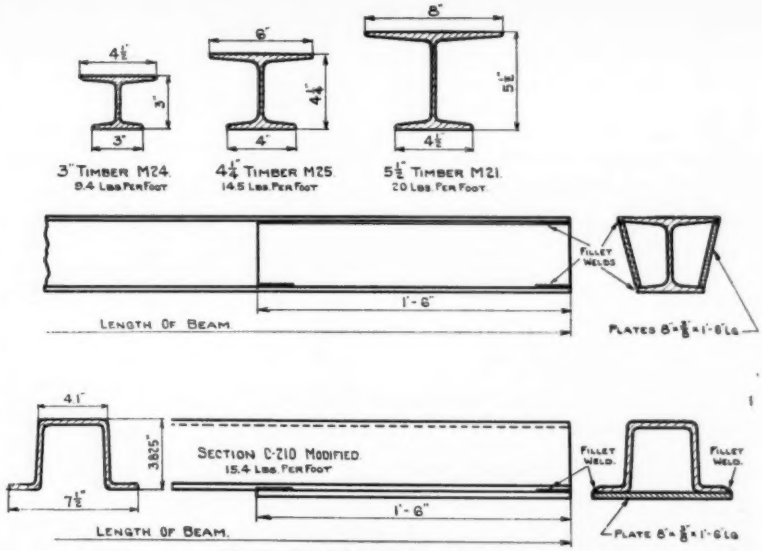
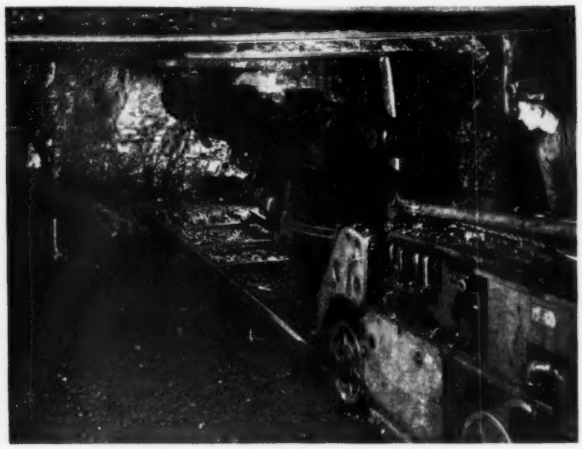


Fig. 3. Steel shapes for roof supports



Safety without interference of posts at the face

Wide steel timber span at room turnout

The 3-in. by 8-in. by 16-ft. oak beams formerly used weighed approximately 85 lbs. apiece and were capable of carrying a uniform load of 526 lbs. when laid flat. Untreated, their cost at this mine was approximately $1.12 each. Experience showed, however, that these timbers, laid flat, could seldom be used more than twice as they crushed over the posts. A steel beam of the same length, such as the Carnegie-Illinois M24 section shown in Fig. 3, weighs only 162 lbs. and costs approximately $5.94. However, such a beam will carry a uniform load of 2,380 lbs.

Thus, on the basis of equal loads, a steel room support can replace four wooden beams and, where its full strength is needed, its cost becomes lower than that of wood, provided it is used more than twice. The useful life of a steel room support depends on the actual number of times it can be re-used, and this in turn depends upon roof conditions and the care exercised in salvage. If a steel beam is slightly bent by roof sag, it may be used again without straightening by installing it with the bow up; when it is not too badly twisted or bent, it may be straightened at the mine shop and used again without difficulty. Labor cost for setting one steel support is less than for four wooden beams.

The mining system used is very well suited to timber recovery because of the short period of time (2 to 3 days) required to drive across the pillar. As a result of all these factors, the mine management at this operation has found that the use of steel beams substantially reduces their timbering costs in open end retreat work. The greatest saving, however, comes from the increased mining efficiency made possible by the wide places which permit mechanical equipment to be used to the best advantage, while assuring safe working conditions.

MUSINGS on DISCIPLINE

● *Think Twice Before "Dishing It Out," and Be Sure It Isn't Heavier Than Warranted*

By C. J. FLIPPEN
Safety Director
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Fuel Department

THE theory of giving discipline for infractions of rules and mine law is based on the hope that the recipient will be controlled to the point of doing things in a standard manner. In an orderly and efficient organization there must be adherence to recognized standards—hence rules and regulations are enforced. The catch is that among officials there are found many different ideas on control which vary with experience, training, mental outlook, disposition and environment. Some give discipline for damage done, others to make a lasting impression on the memory to act as a deterrent—still others are of the opinion that discipline will awaken a feeling of remorse. Some dish it out in order to get revenge. General social control and handling men in the mines are very much the same, and the man who can handle MEN can usually handle most of the details of mining.

It takes a good man to administer discipline so that it will be absolutely impartial to all, for we really like our friends and despise our enemies, contrary to the teachings of the Golden Rule. However, two wrongs do not make a right, such as handing out an overdose of discipline for a small infraction of rules. Making some suffer for the omission of others in order to get the others into line is a bad policy.

It is necessary to have standards, and in order to get that, it follows that discipline is also necessary. How many of us give this subject the thought it really deserves? Many of us do not think deeply enough on this subject and consequently get into trouble. First, there is an essential need of systematic control of all the operations in the mine, the purpose being to get good tonnage, clean coal at a moderate cost, with safety being paramount. Workable plans which have been decided upon beforehand as being the best, a uniform manner of carrying out the work, with all workers conforming, is desirable.

There are so many methods of giving discipline that all cannot be mentioned here. They run all of the way from a mild reprimand to discharge. In arriving at the severity of the punishment the following factors should be considered: the severity of the offense, the mentality of the individual, the physical damage done, what is to be gained by the punishment, the policy of the company in such matters, etc. It should be known by the individual what the punishment is for, and explained thoroughly to him why it is necessary; much patience is needed to get this over. We should always remember to put ourselves in the place of the man being punished if possible, and, considering his outlook and disadvantages or advantages, then proceed to administer what is necessary. Something is necessary, as certain things have to be done according to standard. Discipline is necessary to the point where it will get these things done right and well.

Punishment is persecution where it is carried too far, however, and will defeat our desires. This is where real thinking comes in. Where discipline is unfairly given, the effect on morale is considerable, and to our disadvantage. Where it is given fairly and honestly, with complete understanding between management and men as to what is intended, it is good—it is fine. In other words, we can build up morale or tear it down with discipline. The man with the time book and pencil who has strong prejudices, feelings of revenge and the idea to "get even" is a dangerous cog in any machine, so let's be wary when we have the power to "dish it out."

Is it cheap to "dish it out"? How cheap? Will the recipient try to get back at us later on? Will he succeed? Most of this depends on his understanding of why it was given, so let's tell him about it, sincerely and fairly. Let us remember that strong discipline deters the weak, but invigorates the strong—in plain words, beats down the weak-willed, complaisant persons, but makes the radicals more radical. This is human nature at work and all of us have seen the manifestation, but some do not notice it enough.

Did we ever stop and think that all of us are implicated when things go wrong? We are an organization with the same purposes in mind, if we are loyal and true to the company policies and aims. Let us analyze the cause and case before giving what the power we have enables us to give; then if the individual deserves a large dose—well, let him have it! If we ourselves are implicated to some extent in the omission or sin, that should be considered.

Punishment that is too severe for the offense is shifting responsibility—it is an admission of defeat on our part whether we feel that way about it or not.

Another thing to be considered is that discipline always has an effect on others who are not directly concerned. We shall always have a "gallery" sitting on the fence, watching, criticising and spreading the word around. Will our actions build up the morale of the watchers or tend to tear it down?

During the past several years changes in conditions of management have compelled us to think of new procedure in the handling of the other fellow. It is sad but true that we cannot always be absolutely just and fair in dealing out discipline under present conditions, for some who may not deserve may possibly be hit when the whole thing is considered. With this in mind, we should think harder than ever before—we should prepare ourselves for eventualities before they happen. Let those who control be leaders of men instead of drivers, thus minimizing the necessity of too much discipline of the severe kind. All in all, it's a tough racket, me lads!

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PHILIPPINE CHROMITE

● ***Eyes Focused on This Territory As a Future Supplier of This Strategic Mineral for U. S. Consumption. Production Rose Sharply During Past Five Years***

By DEAN F. FRASCHE
Chief, Geological Survey Division
Philippine Bureau of Mines

WITHIN the past five years considerable attention has been focused on the Philippine Islands as a source of chromite. The steady increase in production shown in the rise of the Philippine Islands during this short period from twelfth to sixth place as a world producer of chromite has been of increasing interest to the foreign base metal industries and to different governments searching for stocks of this strategic mineral. With the present steady demand for chrome steels in industry and war materials, it is but natural that industrial groups are interested in any new source of supply of such an important commodity.

It is purposed here to outline briefly the history of chromite mining in the Philippine Islands, and to furnish information on the location of the different deposits, on reserves, grades and types of ore, and the productive capacities of the individual mines now operating.

Chromite was first discovered in the Philippine Islands in 1922 near Candelaria, Zambales Province, Luzon. In 1925 the reported discovery was examined in the course of a geological reconnaissance and found to be of no importance. However, during the continuation of the field work a large deposit was discovered about 24 kilometers east of Masinloc. This deposit was described as a single massive ore body, and analysis of the ore showed it to be of low grade. Ore reserves were estimated to be approximately 15,000,000 tons.[1]

From 1925 to 1933 only a minor amount of information was added to the knowledge of chromite in the Philippines. With the exception of the discovery of deposits near Lagonoy, Camarines Sur, and the establishment of three new government chromite reservations in Zambales Province, nothing was known about the possible occurrence of this mineral in other parts of the islands. During 1934, in contrast, the Philippine mining industry entered a period of rapid expansion, and the discovery of new chromite deposits increased to and throughout 1937. During this period commercial and potentially commercial quantities of chromite were discovered in Zambales, Camarines Sur, Ilocos Norte, Luzon; in Antique, Panay; in southern Samar; on Homonhon Island; northern end and eastern side of Dinagat Island; on Ambil Island; and in Misamis oriental and Surigao Provinces, Mindanao (Map 1).

Government Resolution

At present there are three government chromite reservations, all of which are in Zambales Province, Luzon. The first reservation was proclaimed and established on September 24, 1925, and covered the area in which the large low-grade deposit had been discovered in the same year. By proclamation on April 24, 1930, the present Reservations No. 1, No. 2 and No. 3 were established, and on August 20 of the same year the original U. S. Government reservation, established in 1925, was released and opened to the public for mineral location. During 1934 32 claims were located in this latter area. Although the present reserved areas are designated as chromite reservations, it must yet be proven that important ore bodies exist within their boundaries.

Luzon Deposits

The most outstanding district from the point of view of reserves is that

Map 1

[1] Elicaño, V. *Chromite Deposits in the Philippines.* Proceedings of the Third Pan-Pacific Science Congress, Tokyo; Vol. 2, pp. 1753-1754, 1926.

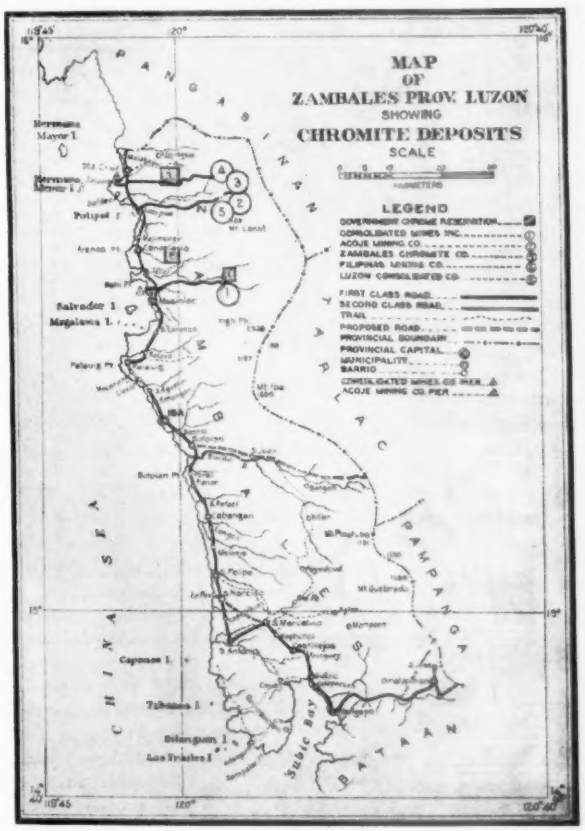
in Zambales Province. Here in a narrow belt of foothills along the western side of the Zambales Mountains, between the municipalities of Masinloc and Sta. Cruz, several extensive deposits of chromite have been found (Map 2). Examination of individual deposits shows that there is a tendency for the chromite to increase in grade northward from the Masinloc vicinity, but also for the individual ore bodies to decrease in size.

Consolidated Mines — Benguet.— The largest single chromite deposit known in the Philippine Islands occurs about 24 kilometers east of the municipality of Masinloc, and adjoins the southern boundary of Government Reservation No. 1. During 1934 this property was acquired by Consolidated Mines, Inc., which subsequently made an arrangement with the Benguet Consolidated Mining Co. for its exploration and development on a profit-sharing basis. The ore on this property is confined to a hill about 150 meters high and 300 meters in diameter. Underground development and sections based on extensive diamond drilling show the deposit to contain 10,000,000 metric tons in a single ore body near the surface. The chromite is massive in character and is of low grade, the chrome mineral itself being a high alumina-chrome-spinel. Because of its inherent chemical nature no mechanical concentration process known can bring the grade of this ore up to that required for the usual metallurgical chrome. The Masinloc ore is admirably suited for refractory use and is now being sold for that purpose.

The mine near Masinloc has been developed, and the ore is mined at the surface. All the chromite is transported by truck over 27 kilometers of first-class roads to the loading terminal at Masinloc, where it is stored in concrete bins. These bins have a capacity of 15,000 metric tons, and are directly connected with a well-protected concrete wharf which permits single-hatch loading. The depth of water at wharf at low tide is 35 ft., and there are ample facilities for the berthing of freighters of any tonnage. Under present conditions the Benguet Consolidated Mining Co. can mine and deliver 600 tons of ore per day, and can load 1,000 tons every 24 hours. Production and analyses of the ore mined to June, 1939, are given in table 1.

Within the past three or four years considerable metallurgical research has taken place on the beneficiation of low grade Philippine chrome ores. The recent discovery and development of the Udy[2] process for the treatment of such low grade ores is expected to shift the Masinloc ores from the refractory class and cause them to be considered a potential source for metallurgical chrome. Before this discovery the Masinloc chromite was considered useless as an ore for the manufacture of ferro-chrome, principally because the chrome content was low and its chrome-iron ratio was unsatisfactory. By the Udy beneficiation process, however, it has been demonstrated that the chrome-iron ratio can be controlled in the alloy manufactured, and at a cost which will permit mining, shipping and smelting Masinloc ore at a profit. The discovery of the new process is of paramount importance to the United States and the Philippines because the Masinloc ore body is the largest single reserve of this strategic mineral under American control.

Pier of Consolidated Mines Co. at Masinloc, Zambales



Map 2

To the northward from the Consolidated Mines property many scattered deposits of chromite have been discovered and a few are now being mined. From the standpoint of reserves and grades of ore the properties owned by the Acoje Mining Company and the Zambales Chromite Company are the most important in this area.

Acoje Mining Co.—The Acoje Mining Company properties are located southeast of the United States Government Reservation No. 3 and approximately 27 kilometers by road east

[2] Udy, M. J. *The Utilization of High-Iron Chrome Ores*, Canadian Institute of Mining and Metallurgy, Vol. XLI, p. 199, 1938.

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of the barrio of Lucopan, Zambales. The company holds 73 chromite claims and has the second largest known reserves in the Philippine Islands. More than 20 lenses of ore have been discovered in this property, all lying close to and can be mined from the surface. These lenses fall in an approximately north-south line, vary in size and grade, and are found at different elevations. One large lens in particular has been proven to a depth of 40 meters with another lens en echelon above it.

Active mining has taken place on 9 of the lenses, and 4 have furnished the bulk of the ore so far produced. As yet none of the ore bodies have been exhausted. Mining of low and high grade ore is carried on simultaneously, and the company now operates 59 sluice boxes for washing fines from the soil overburden. This washing process is still in the experimental stage, but one run of approximately 25,000 tons of soil produced 2,122 tons of chromite fines.

Since the opening of the mine in 1937 the Acoje Company has produced 44,520 metric tons of metallurgical grade ore, 38,211 tons of which have been shipped to the United States, 4,187 tons are now stored at the loading terminal, and 2,122 tons of fines are in stockpile at the mine. Production figures for each lens mined are given in table 2.

The grade of all ore mined to date has averaged better than 51 percent Cr_2O_3. Analyses by the buyers of ore shipped to the United States are given in table 3.

Ore reserves, based on underground development and diamond drilling, are conservatively estimated by the company to be 155,000 metric tons. As much of the claim areas have not been explored, prospecting is being carried on continuously in an attempt to find new ore bodies. Present estimates on unmined ore in known lenses as made by the company's engineers are given in table 4.

All the ore is mined at the surface and transported by truck over 35 kilometers of hard surface all weather roads to the loading terminal at Baluarte. At the terminal are six storage bins which have a total capacity of 10,000 metric tons. The ore is drawn from the bins into mine cars and delivered to ship side for loading. The new Acoje wharf permits double hatch loading and has adequate berthing facilities to accomodate ships of almost any draft. Depth of water at low tide is 32 feet, and the pier and loading terminal are fairly well protected except from the northwest. Under the present loading system 1,000 metric tons of ore can be put on board ship in 24 hours.

Zambales Mining Co.—The Zambales Chromite Mining Company operates northeast of the Acoje property, and approximately 23 kilometers east of the main provincial highway of Zambales, holding 62 chromite claims. It commenced operations in 1937. To date, nine deposits of various sizes and grades of ore have been discovered, but only three have actually been exploited. Of the nine known ore bodies, the Luna, Gonzalito and Ale-

TABLE 1.—MASINLOC CHROMITE PRODUCTION, CONSOLIDATED MINES CO., INC., 1936 TO JUNE, 1939

Year	Production (Metric tons)	Analysis of Ore Cr_2O_3 %	SiO_2 %	Al_2O_3 %	Fe %
1936	76	.....	.....	.....	.....
1937	27,756 (a)	33.26 (b)	3.70 (b)	30.14 (b)	.....
1938	10,023	33.91 (c)	3.78 (c)	30.10 (c)	.....
1939	11,879 (e)	33.63 (d)	3.50 (d)	30.23 (d)	11.54 (d)
Total & averages	49,734	33.60	3.66	30.16	11.54

(a) 3,193 tons shipped to Japan.
(b) Analyses of 12,950 tons.
(c) Analyses of 3,061 tons.
(d) Analyses of 6,912 tons.
(e) First 5 months of 1939.
Analyses for 1937 and 1938 by the buyer.

TABLE 2.—CHROMITE PRODUCTION OF ACOJE MINING COMPANY

Lense number	Production (Metric tons) 1937	Production (Metric tons) 1938	Recovered by sluicing 1937-1938	Total 1937-1938
1	7,170	3,057	155	10,382
2	11,585	4,456	....	16,041
3	....	....	....	....
4	2,983	9,805	790	13,578
5	....	388	20	408
6	....	....	....	....
7	....	14	590	604
8	....	....	....	....
9	....	1,200	....	1,200
10	....	297	....	297
11	262	945	4	1,211
12	....	236	....	236
16	....	....	563	563
Total	22,000	20,398	2,122	44,520

TABLE 3.—ANALYSES OF ACOJE CHROMITE ORE SHIPPED TO U. S., 1937 TO JUNE, 1939

Year	Production (Metric tons)	Analysis of Ore (a) Percent Cr_2O_3	Fe	SiO_2
1937	14,105	51.22	13.27	3.27
1938	14,845	51.05	14.00	2.57
1939	9,261	(b)	....	...
Totals and averages	38,211	51.13	13.63	2.92

(a) Analysis by the buyers.
(b) Not available.

TABLE 4.—ORE RESERVES OF ACOJE MINING COMPANY (Metric tons)

Lens No.	Metallurgical grade ore	Other (a)	Totals
1	2,000	2,000	4,000
2	16,000	5,000	21,000
3	2,000	2,000	4,000
4	5,000	11,000	16,000
5	1,000	1,000	2,000
6	2,000	3,000	5,000
7	10,000	48,000	58,000
8	500	2,000	2,500
9	10,000	2,000	12,000
10	1,000	....	1,000
11	500	1,000	1,500
12	4,000	1,000	5,000
13	1,000	....	1,000
14	4,000	....	4,000
15	5,000	....	5,000
16	3,000	....	3,000
17	....	1,000	1,000
18	....	5,000	5,000
19	....	2,000	2,000
20	....	2,000	2,000
Totals	67,000	88,000	155,000

(a) Ore less than 46 percent Cr_2O_3.

jandro are the largest; these are now in production.

The Luna ore body has a known length of 84 meters and a maximum width of 10 meters, while its depth, known only at its southern end, is 18 meters. This deposit is being mined from an open cut and is producing from 1,200 to 1,500 metric tons per month. Underground development of the Gonzalito deposit shows continuous ore over a distance of approximately 80 meters, while on the surface the deposit has been traced from the level of the Baeto River to the crest of the Alejandro Hill, a vertical distance of almost 70 meters. The Alejandro deposits are made up of several parallel lenses; their vertical and horizontal dimensions, however, are not definitely known. It is estimated by the company's engineers that the combined deposits of the Alejandro and Gonzalito are capable of producing 500 to 1,000 metric tons per month. The remaining deposits are only partly developed and their reserves and possible production capacities are not accurately known.

Present known ore reserves are estimated by the company to be approximately 68,575 metric tons. Ore reserves and grade of each deposit are given in table 5.

TABLE 5.—ORE RESERVES OF ZAMBALES MINING COMPANY
(Metric tons)

Name of Deposit	Estimated reserves in metric tons	Cr_2O_3 Percent *
Burgos No. 1	1,000	48.05
Burgos No. 4	5,000	44.51
Quezon No. 2	5,000	41.85
Luna	11,000	49.00
Alejandro	35,175	48.50
Burgos Sr.	500	49.06
Fred No. 1	700	48.30
Fred No. 2	200	52.09
Plaridel & Zeny	10,000	50.32

*Analyses for Fe, SiO_2, etc., not available.

Since the opening of the mine in 1937, the Zambales Chromite Mining Company has mined approximately 13,000 metric tons. Of this amount 1,043 tons (averaging 48.6 percent Cr_2O_3, and 16.43 percent FeO) were shipped to Sweden, and 3,154 tons (averaging 48.22 percent Cr_2O_3, 17.69 percent FeO and 3.69 percent SiO_2) were shipped to the United States during April and May, 1939.

Transportation of the ore from the mine to the loading terminal is by truck over 23 kilometers of all weather roads. The Zambales Chromite Company leases ore bin space and makes all shipments from the Acoje Mining Company terminal at Baluarte.

TABLE 6.—CHROMITE PRODUCTION OF FLORANNIE MINING COMPANY, 1935-1938

Year	Production (Metric tons)	Analysis of Ore Cr_2O_3 %	SiO_2 %	FeO %	Fe %	Al_2O_3 %	MgO %
1935	457	53.90	2.65	14.52	....	....	....
1936	6,306	53.11	3.11	16.83*	11.61†	11.38†	15.93†
1937	29,518	49.81	5.34	14.54	....	....	....
1938	39,340‡	50.09	3.81	15.07	....	....	....
Total & averages	76,621	51.72	3.72	15.28	11.61	11.38	15.93

* Average of 2,511 tons.
† Average of 3,795 tons.
‡ 25,931 on consignment in United States.

Several other chromite deposits are known in Zambales province. The Filipinas Mining Company, whose properties are north of and adjacent to the Zambales Chromite Company, is reputed to have several thousand tons in reserve. Intensive development work is now being carried on in an attempt to mine their known ore bodies. Japanese capital is interested in this property and the company contemplated shipping 5,000 metric tons (principally float picked off the surface) to Japan in August. The ore is to be loaded and shipped from the Acoje terminal.

Another property in the same area—south and west of the Acoje property—is operated by the Luzon Consolidated Mining Company. This company has produced only a small amount of ore, and their reserves are limited.

Chromite deposits have also been discovered in the provinces of Camarines Sur and Ilocos Norte, Luzon. In the latter district the reserves are considered to be small and of low grade, while in Camarines Sur the larger known ore bodies have been exhausted.

Florannie Mining Co.—The Camarines deposits were discovered about 9 kilometers northwest of Lagonoy during 1933 by the Florannie Mining Company, which later turned their property over to the Benguet Consolidated Mining Company under an operating agreement. After much detailed prospecting and diamond drilling the Benguet Company blocked out and mined 76,621 metric tons of metallurgical grade ore which was transported over a 15 kilometer aerial tram from the Landoc Claim to the loading terminal at Panagan.

Production on the Florannie property rapidly increased during the period from 1935 to 1938, the peak production coming in the latter year. During this short period 50,690 metric tons were sold under contract, and 25,931 metric tons were shipped on consignment to the United States. Detailed production figures on tonnages and grades of ore are given in table 6.

Several small deposits of lower grade have been discovered 9 kilometers north of the Florannie property, but due to adverse transportation conditions these have not yet been developed.

Other Occurrences of Chromite

It has been mentioned above that chromite occurs on several of the Philippine Islands besides Luzon. These deposits are less known, however, principally because they have not been thoroughly prospected and developed; in addition, they are not easily accessible. Lack of good harbors for loading, together with other unsolved transportation problems plus lack of capital, have all helped to discourage their development.

On Dinagat Island, east of Leyte and north of Mindanao, several deposits have been discovered on the north and east coasts. So far the northern area has proved to be the most important; and two companies, the Dinagat Mines Company and the Tagobomar Development Company, are now operating in this section of the island.

Dinagat Mines Co.—The Dinagat Mines Company, with properties near the barrio Loreto on the west coast, holds more than 100 chromite claims. To date 12 lenses have been discovered on this property, but only three have been partly explored. Most of the lenses are small and widely scattered, and much of the ore occurs as finely disseminated chromite in serpentine, thus necessitating concentrating. The main producing lens, however, which is only 1,100 meters from the loading pier, produces a hard lump ore which averages 47.44 percent Cr_2O_3, 14.54 percent FeO, and 1.18 percent SiO_2. The ore reserves of the property are estimated to be 20,000 metric tons,

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Mining chromite with crude hand methods near Loreto, Dinagat Island. Ore from Dinagat's principal pit moves less than a mile by gravity to the loading pier. (See cuts below)

but the possibilities of increasing these reserves are excellent, as many of the known deposits are undeveloped. Open cuts are used in mining, and the chromite is transported by a gravity system to the pier where it is lightered to Cebu or Surigao for shipment to foreign ports. During the past six months this company has produced 1,700 metric tons, most of which has been sold in Europe.

Tagobomar Development Co.—The Tagobomar Development Company, operating on the west coast near Omasadang Bay and northeast of the Dinagat Mines property, has an estimated reserve of 18,000 metric tons of proven ore. As not all of their ore bodies have been fully developed nor have all their claims been prospected, this company has excellent possibilities of increasing their ore reserves in the future. The chromite occurs as nodules and finely disseminated masses in serpentine, and varies from 44 to 53 percent in chromic oxide. Mining is carried on by open cut methods, and the ore is transported by a gravity system to the pier where it is loaded into lighters.

South of Dinagat Island, on the mainland of Mindanao, small isolated lenses have been discovered in the province of Misamis Oriental and Surigao. In the latter province the chromite is situated within the Government iron ore reservation, but has not yet been thoroughly explored. Although the ore is of good grade the reserves are considered to be extremely small. The deposits in Misamis Oriental are found south of Cagayan, 17 kilometers from the nearest road, and consist of small widely separated pockets. Approximately 5,000 metric tons of fines have been mined in this area and are now in stock pile awaiting sale.

On the southern end of Samar near Guiuan, and on Homonhon Island, small tonnages of good grade ore were mined in 1936. In both localities the individual lenses are small, ranging from 500 to 1,000 tons; but the chromite is of excellent grade. Lump ore from these localities ranged from 47 to 54 percent Cr_2O_3 and 10-14 percent FeO, while sands assayed 55 percent Cr_2O_3, 14 percent FeO and 1.6 percent SiO_2. Both Samar and Homonhon offer good possibilities for further chrome discoveries.

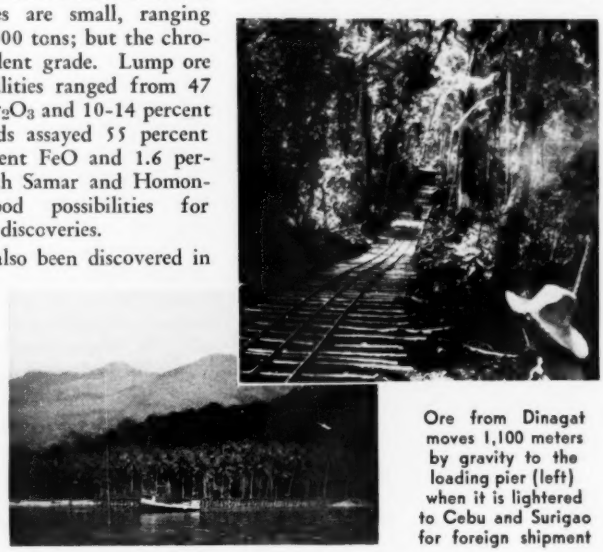
Chrome has also been discovered in Antique Province, Panay; but the grades are low and reserves are considered to be of minor importance.

The most recently discovered chromite deposits are those found on Ambil Island, a small island in the Lubang group northwest of Mindoro. During 1938, Beldon and Company, Manila, acquired the claims and developed several small high grade ore bodies and one large low grade deposit along the north and south coasts of the island. The small ore bodies are of irregular occurrence and are limited in tonnage. Analyses of these ores show 53.43 percent Cr_2O_3; 17.98 percent FeO; 1.51 percent SiO_2; 12.17 percent Al_2O_3; 0.15 percent CaO, and 13.55 percent MgO.

The large lens mentioned above is near the north coast of Ambil and has a known length of 50 meters, a maximum width of approximately 10 meters, and dips to the southwest. Sections through this lens, based on diamond drilling, show a depth of over 33 meters. Surface ore averages 34.09 percent Cr_2O_3 and 14.55 percent FeO, but by crushing and simple table concentration the grade can be increased to 47.69 percent Cr_2O_3, 16.40 percent FeO, 1.09 percent CaO, 4.14 percent MgO, 4.59 percent Al_2O_3, and 4.55 percent SiO_2. The unweathered ore encountered at depth, however, is of lower grade, averaging only 29 percent Cr_2O_3 and 15.40 percent FeO, and can be concentrated to 50 percent Cr_2O_3 only after considerable loss. Low grade reserves on Ambil Island are estimated to be 100,000 metric tons, and the ore bodies are favorably situated for mining and shipping.

Production

The first shipments of crude chromite from the Philippines occurred in 1935. Although in this year only 1,272 tons were exported, production increased to 11,890 tons in 1936 and 69,855 tons in 1937, but during 1938 production dropped to 66,911 tons, due to falling demand in foreign markets. Chromite production for the four-year period reached a total of 149,948 metric tons. Of this total the United States received 129,665 tons, making that country the most important buyer of Philippine ore. Other consuming countries, in order of importance, were Japan, Canada,



Ore from Dinagat moves 1,100 meters by gravity to the loading pier (left) when it is lightered to Cebu and Surigao for foreign shipment

Great Britain, Belgium, Germany, Italy and Sweden.

Conclusion

In the Philippines there are large areas of widely scattered chrome-bearing ultra-basic rocks which are principally confined to two belts along the eastern and western borders of the islands. Geographically the eastern belt rises in Camarines Sur, trends southeast into Samar, Homonhon Island, Dinagat Island, and terminates in Surigao Province, Mindanao; while the western belt commences in Ilocos Norte, trends southward through Zambales Province, the Lubank Island group, northern Mindoro, western Panay, and ends in north central Mindanao. The known commercially important chromite deposits have been discovered in the more easily accessible areas within these belts, but only an insignificant part of the chrome-bearing areas have been systemmatically prospected. Because of poor transportation facilities and lack of development work, little information is available concerning many localities in which chrome ores are known to exist. With the remaining large areas yet to be explored and the known existence of undeveloped chrome deposits, it is not unreasonable to assume the Philippine Islands will become more important as a source of chromite in the future.

TABLE 7.—PHILIPPINE PRODUCTION OF CRUDE CHROMITE, 1935-1938
(In metric tons)

Country of Destination	1935	1936	1937	1938	Total
Belgium	11	....	104	1,321	1,436
Canada	....	....	....	7,112	7,112
Germany	....	43	500	830	1,373
Great Britain	....	49	....	1,661	1,710
Italy	....	508	11	....	519
Japan	210	2,084	3,711	1,926	7,931
Sweden	....	....	202	....	202
United States	1,071	9,206	65,327	54,061	129,665
Totals	1,292	11,890	69,855	66,911	149,948

Arizona Mine Taxes

Although the production of Arizona's mines in 1938 was nearly $1,000,000 less than it was in 1914, the amount of direct state taxes paid by them was 285 percent higher, according to a report recently made public by the Arizona Department of Mineral Resources. The analysis was made for the department by Dixon Fagerberg, C. P. A.

The analysis revealed that this great increase was accounted for by new and additional forms of taxation which have been imposed by the state in recent years. The property tax, which at one time accounted for all of the taxes collected from mines for state purposes, aggregated only 37.2 percent of the total in 1938. The direct sales or production and the income taxes are the principal new sources of state revenue, each comprising roughly one-third of the mine tax dollar.

The report graphically portrayed the growth in mining taxation, pointing out that state taxes paid per ton of copper produced amounted to $8.04 in 1938 against $3.05 in 1914; that taxes per man employed came to $158 last year as compared with $34 in 1914; and that only 11.2 tons of copper were produced in 1938 for every $100 in direct state taxes against 32.7 tons 25 years ago.

J. S. Coupal, director of the Arizona Department of Mineral Resources, in commenting on the analysis, stated: "The mining industry today is assuming more of the tax load than it can continue to carry since its production, average grade of ore and average metal prices are steadily decreasing."

"Taxation has been an important factor in causing the loss in value of mine production in recent years," he continued, "and a continuation of the trend toward greater taxes can be expected to accentuate the tendency toward reduced output. Lower, rather than greater, taxes are needed in order to increase output, and in the end such will provide greater revenue to the state by encouraging the development and exploitation of its resources. What the state needs is more taxpayers, rather than more taxes from present payers."

Eagle-Picher Expands Tri-State Operations

The Eagle-Picher Mining & Smelting Company is preparing to reopen two more mining properties in the Picher, Okla., field—the Grace Walker in the southeast part of Picher, and the Old Commerce Bennie near Cardin.

The company recently started operations at the John Beaver No. 1 mine near Cardin, and at the La Salle mine northwest of Picher. Operations were also started a short time ago at the west field shaft on the Southside lease, north of the Central mill. The east shaft on the lease, to be opened later on, is being dewatered.

Several hundred additional men will be employed by the company under this extended operating program.

The company has installed a seven foot Symons shorthead cone crusher near the foot of the tailings conveyor at the Central mill, to be used to grind down the tail products of the cone plant for commercial purposes, particularly as railroad ballast.

High Tension Power Circuits In Coal Mines

The installation of high-tension power circuits in coal mines is discussed in a report recently published by the Bureau of Mines, Department of the Interior.

In the mechanization of coal mines, there are circumstances under which it may be desirable to carry 2,300- or 4,000-volt alternating-current power circuits along entries to transformer banks, mercury-arc rectifiers, and other underground substation equipment, instead of adopting the surface pole line-type of construction.

The cable installed inside of a mine may be called upon to resist adverse conditions such as exposure to injury by acid water, falling coal and rock, and derailed cars. While damage to the cables might in itself prove costly from the standpoint of maintenance and repair, the dangers of shock and of ignition of gas and coal dust resulting from such damage are extremely important questions to be weighed in the selection of cables and the method of installing them.

In this report, various types of cables that have been designed to meet severe underground conditions, are discussed. Three types of installation in use, namely, floor, trench, and suspension, are described and their advantages and disadvantages are pointed out. Methods used in grounding and splicing cables are considered also.

Copies of Information Circular 7044, "Installation of High-Tension Power Circuits in Coal Mines," by E. J. Gleim, may be obtained free of charge from the Bureau of Mines, Washington, D. C.

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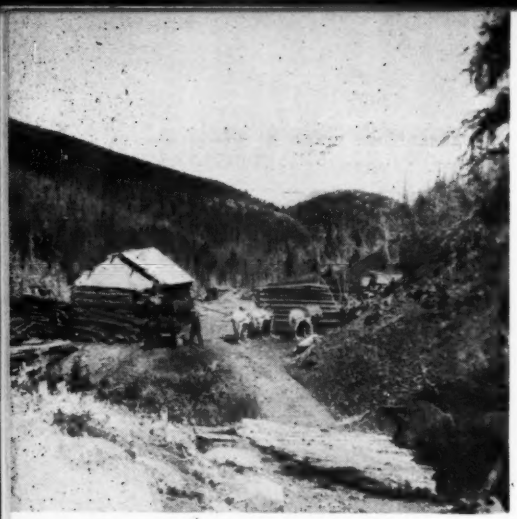

Camp at chrome project in Stillwater County, Montana

Strategic Minerals Investigations by the Bureau of Mines*

● ***Exploration and Development Program Now Under Way Outlined. Principal Hope is to Locate Reserves of Present Sub-Commercial Grade***

By JOHN WELLINGTON FINCH
Director, Bureau of Mines

THE large number of inquiries from many sources received by the Bureau of Mines during recent months indicates that there is widespread public interest in the so-called "Strategic Minerals Act"—Public No. 117, 76th Congress, 1st Session (S. 572), approved by the President, June 7, 1939.

In view of this interest, because of considerable misunderstanding of the provisions of the act and because of the interest expressed in procedure of the Bureau of Mines and the Geological Survey under the act, it seems appropriate to discuss it briefly on this occasion.

The Act, Public 117, is entitled "An Act to provide for the common defense by acquiring stocks of strategic and critical materials essential to the needs of industry for the manufacture of supplies for the armed forces and the civilian population in time of a national emergency, and to encourage, as far as possible, the further development of strategic and critical materials within the United States for common defense."

Section 1 of the act further defines its purposes, among which, of particular interest to the mining fraternity, is encouragement of the development of mines and deposits of these materials within the United States. Sections 2 to 6 inclusive prescribe the modus operandi for making the act effective and authorize appropriations therefor. In this connection it should be noted that the act does not appropriate money but is merely an enabling act under which appropriations may be made. Although it was approved by the President June 7, 1939, Congress did not make it effective by an actual appropriation of funds until August 5.

Broadly the act may be divided into two parts; first, that part authorizing appropriations for the accumulation of stockpiles of strategic materials, and, second, that authorizing appropriations for the investigation of domestic deposits of "Ores and other Mineral Substances" by the Bureau of Mines and Geological Survey.

Strategic Minerals During World War

The seriousness of our strategic mineral problem was emphasized with distressing effect during the World War when grave consequences were averted only by the adoption of a hastily conceived national program which ultimately proved to be absurdly extravagant both in man power and money. The demoralization of international trade by submarine warfare and the commandeering of shipping facilities for military needs forced the nation to face the problem of speeding up its industrial machine for the prosecution of a major war with supplies of many essential raw materials drastically curtailed because of complete lack of advance planning for such a contingency. Emergency measures were adopted. Production from remote and totally uneconomic deposits was stimulated, and industry was

* Presented to 6th Annual Metal Mining Convention and Exposition, American Mining Congress, Western Division, Salt Lake City, Utah, August 28, 1939.

forced to accept off-grade materials to which it was unaccustomed. This resulted in delays and confusion and inefficiency in the use of labor. Ultimately the Army and Navy were forced to lower their specifications for military equipment, and the meager supplies of strategic minerals available were rationed to consumers under strict regulations. Prices skyrocketed to unprecedented levels, and, despite the terrific cost, disaster frequently was avoided only by a narrow margin. The most serious procurement problems were encountered in manganese, chromium, tin, platinum, tungsten, nitrates, potash, pyrites, mica, antimony and vanadium.

Changes Since 1918

During the 20 years that have elapsed since the close of the war our strategic mineral position has been improved in some directions and aggravated in others. We no longer are vitally dependent on Chile for nitrates, as a substantial part of our consumption is supplied by synthetic material made from atmospheric nitrogen. We now produce a large part of our requirements of potash, and we possess sufficient capacity to supply all our needs if necessary. Domestic production of platinum has increased materially as a result of recent new operations in Alaska that were financed by the Reconstruction Finance Corporation. Molybdenum is now produced in abundant quantities, and reserves of vanadium apparently are adequate to take care of expanding production under favorable prices. During the World War our chemical industry existed to a very large extent on Spanish pyrite; but today domestic pyrite production has been increased substantially, and our domestic sulphur industry has grown to major proportions and maintains stocks sufficient to guarantee two years' consumption. We no longer are dependent on Asiatic sources of antimony, owing to the establishment of a smelter at Laredo, Tex., which is equipped to supply large tonnages of antimony derived from Mexican ores. The Bureau of Mines has played a vital part in many of these developments. In addition the Bureau has made many contributions toward improved technology in the treatment of some of our low-grade deposits of strategic minerals. These as yet have not resulted in any peace-time commercial developments, but they should be of inestimable value in emergency exploitation of sub-marginal resources.

All of the foregoing accomplishments have eased considerably our strategic position in the minerals mentioned, but unfortunately the rapid increase in the use of alloys has made us more dependent than ever on foreign sources of manganese, chromium, and nickel. The situation in these materials has been further aggravated by the depletion of the very limited high-grade reserves of manganese and chrome ores during the last war and, in the case of nickel, by the transfer of refining operations from the United States to Canada. Since 1923 manufacturers of aluminum in this country have obtained much of their ore from South American bauxite deposits. We still depend almost entirely on overseas supplies of tin, the use of which has increased greatly.

Purchase of Stocks

Thus we see that the World War served to emphasize our dependence upon foreign sources for certain minerals that are not produced in this country in sufficient quantity for our industrial needs or of a grade considered suitable for use in current technologic practice. That some of these minerals are not developed, and may not exist, in this country in sufficient quantity and of a quality commensurate with our needs is generally recognized. That some of them do exist in such quantity and quality in the United States is a controversial subject, which it is not my purpose to discuss. That a matter of years would be required to explore and develop them to a productive stage where they could supply our industrial and emergency needs is not controversial.

It follows that for hurried accumulation of adequate stocks under an impending crisis, resort to foreign sources would be necessary, and at present, the extent to which domestic deposits of some of the strategic minerals might contribute to our needs is not definitely known, notwithstanding the lessons of the great war.

Sections 2 to 6 of the act cover the procedure for acquisition of stocks of strategic minerals. In brief, the Secretaries of the War, Navy and Interior are authorized to act jointly through the Army and Navy Munitions Board, to determine which materials should be considered strategic and critical. The Secretaries of the War and the Navy, when they deem such action appropriate, shall ask the Secretary of the Treasury to purchase these through the Procurement Division of the Treasury Department, in accordance with specifications prepared by that Division and approved by the Secretaries of War and Navy.

It should be noted that the Bureau of Mines and the Geological Survey are not charged with any duties whatsoever in connection with such purchases. Producers in a position to supply mineral for stockpile purposes, therefore, should address inquiries to the Treasury Department, attention of the Procurement Division.

Following is a list of strategic and critical materials issued by the Army and Navy Munitions Board Commodities Division and dated January 7, 1939:

Left—Bulldozer clearing incidental trees in strip previously cut, preparatory to trenching Chrome project at Casper Mt., Wyo.

Below—8-ft. trench cut by bulldozer on Antimony Ridge, Yellow Pine, Idaho

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LIST OF STRATEGIC MATERIALS (17)

Aluminum	Optical Glass
Antimony	Quartz Crystal
Chromium	*Quicksilver*
Coconut Shell Char	Quinine
Manganese, ferro-grade	Rubber
	Silk
Manila Fiber	*Tin*
Mica	*Tungsten*
Nickel	Wool

LIST OF CRITICAL MATERIALS (20)

Asbestos	Nux Vomica
Cadmium	Opium
Coffee	Phenol and Piric Acid
Cork	
Cryolite	Platinum
Flaxseed	Scientific Glass
Fluorspar	Tanning Materials
Graphite	Titanium
Hides	Toluol
Iodine	Vanadium
Kapok	

In the above tabulation, "strategic materials" are defined as those "essential to the national defense for the supply of which in war, dependence must be placed in whole, or in part, on sources outside the continental limits of the United States, and for which strict conservation and distribution control measures will be necessary." "Critical materials" are defined as those "essential to the national defense, the procurement problems of which in war, while difficult, are less serious than those of strategic materials because they can be either domestically produced or obtained in more adequate quantities or have a lesser degree of essentiality, and for which some degree of conservation and distribution control will be necessary."

Differences of opinion and failure to adopt a realistic attitude on the extent of domestic resources have delayed an adequate solution of our deficient mineral problem all these years, and public interest demands that an authoritative answer to this question be determined once and for all. Because the hope of profitable investment of capital in such an enterprise is remote, proper consideration by private enterprise is precluded.

Investigation of Domestic Deposits of Essential Minerals

Section 7 (a) of the Act defines the duties of the Bureau of Mines and the Geological Survey with respect to the investigation of domestic deposits of essential ores and other mineral substances.

The Secretary of the Interior is authorized and directed through the Director of the Bureau of Mines and the Director of the Geological Survey to make scientific, technologic and economic investigations concerning the extent and mode of occurrence, the development, mining, preparation, treatment and utilization of ores and other mineral substances found in the United States or its territories or Insular possessions which are essential to the common defense or industrial needs of the United States.

It has been the function of the Geological Survey for years to investigate the extent and mode of occurrence of mineral deposits, and thus appropriations under the present act merely enable expansion of the Survey's functions with respect to deposits of certain minerals. This will be discussed by Mr. D. F. Hewitt, Chief of the Division of Metalliferous Deposits of the Survey.*

Likewise, the Organic Act establishing the Bureau of Mines provides for "inquiries and scientific and technologic investigations concerning mining and the preparation, treatment and utilization of mineral substances. . . ." Thus the new law, Public 117, 76th Congress, as quoted in this paper provides for similar investigations to those authorized in the Organic Act but with emphasis on certain minerals.

The Act of 1939 provides, however, for additional investigations not previously authorized specifically. Quoting further, this Act specifically provides as follows: "to explore and develop on public lands and on privately owned lands with the consent of the owner, deposits of such minerals, including core drilling, trenching, test pitting, shaft sinking, drifting, crosscutting and sampling, . . . necessary to determine the extent and quality of such deposits and the most suitable methods of mining and beneficiating them." Although it might be possible to conduct investigations of this nature under the earlier Act establishing the Bureau of Mines, the operations just recited have not been undertaken except by special Act of Congress, as in the case of core drilling for potash in Texas and New Mexico (S. 1821, 69th Congress), and the development of helium in the Amarillo field.

It should be noted that the Act does not authorize loans or grants to owners of deposits of strategic minerals. This is emphasized because of an apparent general misunderstanding on this point. The intent of the Act is that certain facts regarding such deposits be determined by the Bureau of Mines and the Geological Survey as they relate to the needs of the United States and that the Government is not concerned with the development of the property of any individual or corporation for his or its benefit. On the other hand, it is hoped that, as a by-product of the investigations, private enterprise may be stimulated.

The policy of the Bureau of Mines in selecting projects for investigation is governed by the intent of the Act as expressed in the words, "to provide for the common defense." Therefore, projects are being selected on a broad national basis without reference to their possible local effect, and state and district boundaries are ignored. The Act does not provide for allotments of funds to state or regional agencies for carrying out its provisions, but the Bureau of Mines will welcome any information that such agencies may be prepared to offer that will aid in successful prosecution of its program.

In effect, the Strategic Minerals Act imposes additional duties to be per-

Trenching by bulldozers has speeded up and facilitated exploration work. In some cases only a few hours have been required to open up suitable exposures for sampling

* Mr. Hewitt's paper will be carried in the January JOURNAL.

formed by the Bureau of Mines, particularly as they relate to exploration of ore deposits. As related to research designed to develop new methods of beneficiation and treatment for extraction of the metals, the Act requires an expansion of work in an established field of the Bureau.

The investigations of the Bureau of Mines under the Act are thus of two different but interdependent kinds, and will be handled by two divisions working in close cooperation.

Prospecting and Development

Prospecting or exploration will be handled by the Mining Division and the organization is being built around the present staff of that division. Additional employes are being engaged from the Civil Service registers. Others are not eligible.

It is at once evident to mining engineers that the funds provided under the Act are inadequate to accomplish extensive development, as that term implies the blocking out of ore in preparation for production. It is, therefore, proposed to limit the investigations to surface and underground exploration to moderate depths, to determine the lateral extension of known deposits, provide additional information regarding their probable continuation in depth, and to ascertain the grade of ore exposed by the exploratory work.

In selecting deposits for investigation, the Bureau of Mines is being guided by the Geological Survey, and during the progress of exploratory work the Survey will cooperate with the Bureau of Mines by observing disclosures made on each project and aiding in the interpretation of them. Since the Survey has studied present exposures of most of the known deposits in the United States, those have been selected for investigation by the Bureau which, in the opinion of the Survey geologists, offer possibilities of providing substantial reserves of strategic minerals, and concerning which more information is needed than that supplied by outcrops and existing underground developments.

Certain kinds of deposits lend themselves to systematic exploration but others do not, and it is upon the first kind that the Bureau of Mines will concentrate. Thus tabular deposits, either dipping or in flat beds, and having, or likely to have, considerable lateral extent, can be explored systematically. Deposits in the form of short, disconnected lenses, erratically distributed over a large area, may contain important tonnages in the aggregate, but do not lend themselves to such exploration; the reserves that could be established would not be commensurate with the amount of money expended. This immediately narrows the field, as is desirable, because funds must be expended each year on individual projects in sufficient amounts to secure significant results whether they be favorable or unfavorable; expenditures over a large number of small scattered deposits could yield no adequate or conclusive information.

Cleaning out trench preparatory to sampling at the Nightingale Tungsten project in Pershing County, Nevada

In the light of present knowledge, the outlook for disclosing large deposits of deficient strategic minerals of present commercial grade is admittedly not promising. The prospect becomes more hopeful when viewed from the objective of disclosing reserves for strategic purposes, that need not necessarily be of immediate commercial grade but might be commercial under the stimulus of war prices or of strategic value when price would be relatively unimportant. Thus, relatively small deposits of commercial grade may be accompanied by much larger "halos" of lower grade material that contain sufficient quantities of needed metal that could be extracted "at a price."

It is understood that the Geological Survey contemplates continuing its investigations of areas known to contain deposits of strategic minerals, which, during the course of the four-year program provided by the Act, it is hoped will lead to the designation of additional individual deposits for exploration by the Bureau of Mines.

Welcome Information on Deposits Deserving Attention

Information regarding deposits that deserve attention is welcomed by both the Bureau of Mines and the Geological Survey. In this connection, it is probable that many established mining and exploration companies have in their files detailed reports on deposits that have not been of interest to them because they are of subcommercial grade, but which may well be of considerable interest because of their potential value as a strategic reserve. It is hoped that such companies will offer access to their maps and files by Government engineers and geologists engaged in the present investigations.

Metallurgical Investigations

The Act authorizes and directs that investigations be made concerning the "preparation, treatment, and utilization of ores and other mineral substances found in the United States or its territories or Insular possessions . . . to devise new methods for treatment and utilization of lower grade reserves and to develop substitutes for such essential ores and mineral products. . . ."

This part of the investigations authorized by the Act has been assigned to the Metallurgical Division of the Bureau. That Division will also do the analytical work on samples obtained by the Mining Division during the course of its exploratory work, and these results will be used for guidance in continued work and in calculation of tonnages and grade. In turn, the Mining Division will procure and supply to the Metallurgical Division, material in such quantities and from such deposits as the Metallurgical Division may require for research and testing for treatment processes.

In order to comply with the requirements of the Act, additional Civil Service personnel is being employed by the Metallurgical Division which will work under the direction of the present Division staff, and some additional equipment is being installed at existing Bureau of Mines field stations.

From the nature of the problem and the wording of the Act, it is anticipated that the new work will be directed largely toward methods of beneficiating material that cannot at

(*Continued on page 52*)

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A Critical Review of Occupational Disease Legislation*

● ***With Full Cooperation of All Interests Affected the Administration of These Laws Should Prove Successful. Should Be Done by States—Not Federal Government***

By THEODORE C. WATERS
Attorney at Law
Baltimore, Md.

THE problem of occupational disease injuries sustained by employes in the course of their employment has received extensive publicity and attention throughout the country during the past several years and has resulted in the enactment of new laws and amendments to existing laws, liberalizing and extending the benefits of our workmen's compensation statutes. This legislation has been far-reaching in its effect upon industry, creating new problems for those executives who guide the destinies of our large and small business enterprises. It is direct in its effect upon the employer-employe relationship and has given rise to misunderstandings and misconceptions of attitudes on the part of both employers and employes.

I know of no group in this country that should be more interested in and concerned with occupational disease legislation in the great mining states of the West than the American Mining Congress, and I commend your executives for the emphasis they have given to this subject upon the present program. Many of the states in which your members operate have not as yet enacted occupational disease compensation laws and, in contemplation of such possible enactment, you now have the benefit of the experience of the administration of such laws in other industrial states. In our approach to this subject we must bear in mind that these laws are of recent enactment and, in the course of their administration, defects have developed that have necessitated amendments. These laws are not uniform; they have been designed to meet the industrial conditions in the particular states to which they apply, and their continued administration will undoubtedly develop further defects that must be remedied by amendments.

In order that I may properly identify myself, I would like to state in the beginning that my experience with the problem of occupational diseases has been in the professional capacity of a lawyer, first, in defending common law litigation, representing industries having occupational disease hazards, and later, as a representative of manufacturers and employers in drafting legislation designed to make occupational disease injuries compensable. From this experience over the past 10 years, I have reached the conclusion that industry has been persecuted and plagued with common law suits instituted by employes to recover the alleged occupational disease injuries; that employes, on the other hand, should be compensated for disease injuries which they sustain as a result of their employment; that common law procedure, with jury trials, is a thoroughly unsatisfactory method for the determination of this type of dispute, being unfair to employer and employe alike, and believe that the answer to the problem must be found in the amendment of our compensation laws to provide compensation.

Origin of Compensation Laws

The Workmen's Compensation laws resulted from an economic need to impose upon an employer the obligations of an insurer for the protection of his employes against accidental or traumatic injuries. Prior to the enactment of these laws, the common law liability of an employer for accidental injuries to his employes was dependent upon proof of the employer's negligence, and the common law recognized the following defenses available to the employer in such actions:

1. Employe's assumption of risk.
2. Employe's contributory negligence.
3. Negligence of employe's fellow servants.

Common law litigation proved to be unsatisfactory for the determination of this type of dispute; its procedure was complex, the law permitted dilatory pleadings, resulting in extensive delays, while the cost of such litigation was out of proportion to the benefits sought to be recovered. This resulted in the enactment of compensation acts, which simplified procedure, expedited hearings and enabled the employe to procure a speedy and inexpensive determination of his cause, with the prompt payment of benefits. The Compensation Acts limited the employer's liability as to amount, but assured the employe of compensation, irrespective of the negligence of the employer or the employe.

The Workmen's Compensation Acts were designed primarily to provide compensation for accidental or traumatic injuries, and not for occupational disease injuries. This fact is most important in considering the history of the development of the administration of our compensation laws. There is an important distinction between accidental injuries and occupational disease injuries. Accidents occur at specific times and may be readily discovered, and usually there is no question as to the particular employer in whose employment the acci-

* Presented to the Sixth Annual Metal Mining Convention and Exposition, American Mining Congress, Western Division, Salt Lake City, Utah, August 30, 1939.

dent occurred. On the other hand, occupational diseases may be slow of development, unknown to the employer and employe until disability occurs; the injuries sustained are continuing injuries over an extended period of time and may be incurred while the employe is working for one of several employers. Therefore, in order to provide compensation for occupational disease injuries, it has been necessary to amend the Workmen's Compensation Acts and to add special provisions that take into consideration the peculiar problems presented by this type of injury.

Occupational Disease Compensation laws were first enacted by the states of California and Wisconsin in the year 1919; from 1919 to 1930 by four other states; from 1930 to 1939 by an additional 17 states. The state of Arkansas has also enacted an occupational disease compensation law which, however, does not become effective until approved by referendum.

During the recent sessions of our state legislatures, a great number of bills were introduced to amend the compensation laws by providing occupational disease coverage or by increasing benefits under the existing laws. Most of this legislation failed of enactment, but succeeding legislatures will again have the same problem presented to them until all of the industrial states have enacted these laws. This widespread legislative activity is indicative of the national interest that has been aroused to perfect the methods of preventing occupational disease injuries and to provide compensation for those who suffer actual disablement therefrom during the course of their employment.

Basic Principles Underlying Occupational Disease Compensation Laws

The occupational disease compensation laws that are now effective in the various states are not uniform, but there are certain basic principles underlying them which are common to all. We must recognize that the issues presented in this discussion are controversial and give rise to serious disagreement among the parties affected. I have no particular pride of opinion in the views that will be expressed during the course of my remarks but simply present them for your consideration, and hope that by open discussion of controversial matters we may find some answer that will assist in the solution of these legislative problems. I suggest the following subjects for discussion:

I. State Legislation
   1. Scope of the Law—schedule of compensable diseases or general coverage.
   2. Medical Boards—their creation and powers.
   3. Bureaus of Industrial Hygiene—their creation and power.
   4. Special provisions for pneumoconioses.
      (a) Limitations relating to partial disability.
      (b) Limitations relating to monetary liability.
      (c) Limitations relating to aggravation of existing disability.

II. Federal Legislation
   1. Senate Bill No. 2256.

* * *

I. State Legislation

1. *Scope of the Law—Schedule of Compensable Diseases or General Coverage*

In drafting legislation, consideration must be given to the scope of the law. The law, using the "schedule" plan, may provide compensation for certain named diseases or, using the "general coverage" plan, may provide compensation for any and all occupational diseases. To date 13 states have adopted the schedule method,* while 10 states and the District of Columbia have adopted the general coverage method.† Considerable difference of opinion exists with respect to which method is preferable, and I would like to call to your attention the advantages and disadvantages of both.

The principal advantages of the schedule system are:

1. It is definite and limits the compensable diseases to those named in the law, describing the processes wherein the hazards exist.

2. It avoids the necessity of judicial interpretation of the scope of the law.

3. It defines specific hazards and better enables employers to perfect protection against them.

4. It reduces the cost of insurance.

The sole reasoned objection to the schedule method is that new diseases may develop from the perfection of new industrial processes and the use of newly discovered chemicals and gases or their compounds, for which compensation would not be provided. This criticism is sound but, as such new industrial diseases become recognized by the medical profession, succeeding sessions of the legislature are available for the amendment of the law to add the newly discovered diseases to the schedule.

The advantage of the general coverage law is that it makes compensable all occupational diseases, if we know what we mean when we use the term "occupational disease." Some laws attempt to define this term, but after careful study, I have yet to find a definition that is satisfactory. Other laws do not define the term which is, therefore, left to judicial interpretation. There are countless court opinions defining the term, "occupational disease." All of these definitions are in hopeless conflict and it is a fact that in those states having general coverage laws it is impossible for the employer, the employe, or the insurance carrier to know just what occupational disease risks are covered by the statute. It is most unfortunate that the scope of the law is thus left to administrative and judicial interpretation, for the natural tendency of our courts and administrative agencies is to interpret the law liberally and most favorably to the claimant. I agree that the laws should be so interpreted but, under the general coverage method, it is possible that compensation may be sought for every human ill to which an employe may be subject. Claims for pneumonia, scarlet fever, flat feet, the common cold, and every type of illness have been and are being filed under these statutes. This provokes the concern that these laws may be administered as general health insurance laws. I do not understand that such is the purpose of any occupational disease law, and believe that they should not be so administered.

2. *Medical Boards—Their Creation and Powers*

The diagnosis of occupational diseases and the evaluation of the resulting disability have been so difficult and the cause of so much dispute that most of the state laws make provision for medical boards to assist the administrative agency in its determination of the medical questions involved in claims.

Common law litigation to decide occupational disease claims has failed because of the technicalities, delays and expense of procedure. Even under the compensation laws litigants are frequently faced with the necessity of procuring and paying for expert pro-

* Arkansas, Delaware, Idaho, Kentucky, Maryland, Michigan, Minnesota, Nebraska, North Carolina, Pennsylvania, Rhode Island, Washington, West Virginia.

† California, Connecticut, Indiana, Illinois, Massachusetts, Missouri, New York, North Dakota, Ohio, Wisconsin.

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fessional testimony in behalf of the position they seek to maintain. I believe that all of us who have followed the administration of compensation legislation have been impressed with the news items in our large cities, dealing with the exorbitant fees paid by both claimant and employer in compensation cases which, in some instances, amounts to no less than actual legal and medical racketeering. Compensation procedure should be as simple, direct and inexpensive as possible. The most humble claimant is entitled to have his case heard without the necessity of engaging professional witnesses on his behalf.

What better agency could be established to determine controverted medical questions than a competent, nonpartisan medical board, trained and experienced in industrial diseases? If such a board is given the power to determine these questions, the successful administration of occupational disease laws should be greatly enhanced and should avoid the imposition of prohibitive costs upon the parties litigant.

The laws of three states—Michigan, Ohio, and Pennsylvania—as amended by the Acts of 1939, require cases involving controverted medical questions to be referred to a medical board for determination, the decisions of such boards being binding upon the administrative agencies. In most states, the medical examiners serve in an advisory capacity to the administrative agency—that is, to the Workmen's Compensation Bureau, Referee, or Industrial Commission.

In my judgment, provisions of this type are essential to any occupational disease compensation law. I believe that in the course of the administration of these laws, public confidence in medical boards will become so established that the tendency will be towards expanding, rather than limiting their powers, thereby avoiding the review of their decisions on questions of fact by the administrative agency or by our courts of law.

3. *Bureaus of Industrial Hygiene—Their Creation and Powers*

The prevention and control of occupational disease injuries is and should be the goal of everyone interested in the subject of industrial hygiene. Economically, prevention is preferable to compensation. Employes are more concerned about the maintenance of their health than in compensation for injuries to that health, while to employers, prevention will prove to be but a small portion of the cost of compensation.

Bureaus of Industrial Hygiene have been established in 30 states and 3 cities—Detroit, St. Louis, and Baltimore. In all of the states except New York and Massachusetts, the Bureaus are in the state health departments; in New York and Massachusetts they are in the State Department of Labor. Their primary purpose is directed towards the prevention of the incidence of occupational diseases in industrial processes, and throughout the several states they are undertaking programs to study the industrial conditions that exist therein and to effect the ways and means for the prevention of occupational diseases. Most of these bureaus have been established recently and are still in the formative stage, but their value has already been proved and in due time the public will come to recognize the competent and effective assistance that they will lend for the elimination of disease hazards.

One of the principal functions of Bureaus of Industrial Hygiene is the formulation of codes, rules or regulations for the prevention of occupational diseases which, upon adoption, have the force and effect of law. Many of the states have adopted such codes, rules or regulations for those industries wherein potential disease hazards exist. The importance of this activity should not be minimized, and industry should interest itself in the drafting of the rules or codes under which it will be permitted to continue its manufacturing processes, so that unreasonable and unworkable regulations will not come to have the force and effect of law.

Certain informed criticism has been directed towards the formulation of codes, some industrial hygienists believing that the primary problem is one of education and cooperation and that more can be accomplished by this method than by enforcing regulations that may be termed technical and arbitrary. However, in those states where the law authorizes state agencies to formulate rules and regulations for the control and prevention of occupational diseases, codes have been and will continue to be adopted, and industry should interest itself in their formulation so that it will thereby be assisted in the solution of its problems rather than penalized for technical violations. Prior to their adoption, complete surveys of the industries sought to be regulated should be made for the purpose of ascertaining the operating conditions and peculiar problems involved in their processes. State agencies should cooperate with representatives of employers and employes so that, when adopted, the proposed codes would receive the full cooperation of industry in their administration, and so accomplish an effective program of prevention.

4. *Special Legislative Provisions for Pneumoconioses*

Of all of the occupational diseases that have perplexed employers and legislative committees that have studied the form of laws providing compensation, the pneumoconioses have presented the most difficult problems and, in view of the dust hazards existing in the mining operations conducted by your member companies, I would like to emphasize certain of the legal problems that such compensation presents.

The silica hazard exists in most of the mining operations in which your member companies are engaged. You have all heard of silicosis and the problem that it has presented to industry. I believe that that problem has been grossly exaggerated. Some years ago a flood of common law suits, based upon alleged silicosis claims, swept through the country and occasioned extensive publicity. That litigation, costly to all litigants, served the fortunate purpose of proving the inadequacy of common law procedure to adjust these disputes between employers and employes to which I have previously referred, and since then we have seen the progressive steps taken by the various state legislatures to provide some means of compensation for silicosis injuries.

Please do not take my remarks as minimizing the seriousness of silicosis. However, I do believe that there is far less disabling silicosis in industry and in mining than has heretofore been popularly believed, and it is with respect to the disability of employes resulting from silicosis that the most difficult legislative problems are presented. Legislative provisions are necessary in order to avoid the imposition upon industry of unjust compensation costs and to award proper and just compensation to those who may be injured. These provisions relate primarily to the following limitations of the employers' liability.

1. Limitations for partial disability.
2. Limitations of monetary liability.
3. Limitations for the aggravation of an existing disability not otherwise compensable.

Limitations for Partial Disability.—The primary purpose of Workmen's Compensation legislation is to provide compensation for *actual* disability. Silicosis is disabling only when accom-

panied by active infection, and many of the states have adopted legislative provisions denying compensation for partial disability.‡

Many silicotics are engaged in trade, not knowing of their affliction. All employes subject to dust exposure show some fibrosis of the lungs not, in fact, disabling. In spite of the medical information that has been developed with respect to the diagnosis of silicosis, the fact remains that the intricacies of the medical aspects of the disease are unknown to the average practicing physician. I know of repeated instances where employes, subject to dust hazards, have been told by physicians practicing in the neighborhood of their plants that they have silicosis and are, therefore, disabled. Such diagnoses have been made without proper roentgen or clinical examinations, the doctors concerned having had no experience in the diagnosis of silicosis.

If the employe is not actually disabled, but is told that he is suffering from this disease, he worries, gives up his job, broods over his condition and eventually he and his family become public charges upon their community. From the standpoint of the employer, improper diagnoses may result in legal persecution by common law suits or unjustified compensation claims, which are not only expensive but detrimental to the entire employer-employe relationship.

In my judgment, provisions denying compensation for partial disability from silicosis should be included in any proposed compensation law until some competent and approved method of evaluating partial disability has been recognized and accepted by the medical profession. As authority for such legislative provisions, I quote the following statements contained in the Report on Medical Control of the National Silicosis Conference, Bulletin No. 21, Part 1, issued by the United States Department of Labor:

"A diagnosis of silicosis does not necessarily mean disability, and therefore, a complete diagnosis should state whether a decreased capacity for work is evidenced, its cause, and an estimate of its degree."

"A complete diagnosis should furthermore state whether or not pulmonary infection is present, active, or latent, and if possible the causative organism."

and

"Attention is called to the fact that a diagnosis of silicosis does not necessarily mean disability. Silicosis is a slowly developing disease. Slight subjective symptoms and roentgenological evidence of pulmonary changes may be present for many years prior to the development of any measurable decreased capacity for work. In reports of investigations made in the United States, seldom has silicosis without pulmonary infection been found to produce serious disability."

‡ Arkansas, Idaho, Maryland, Michigan, New York, Ohio, Pennsylvania.

Another reason for the denial of partial disability compensation for silicosis is that the original award may place the claimant upon the compensation pay roll for life. His case may be reopened from time to time, and increasing disability benefits awarded; eventually, even years after the termination of his employment, he may again reopen his case and apply for total disability benefits. To manufacturers and their insurance carriers this is a matter of serious concern and, if compensation for partial disability is allowed, the ultimate liability of the employer in such cases may well be indeterminable and, therefore, the risk uninsurable.

Limitation of Monetary Liability.—Employes engaged in those industries having silicosis hazards have a history of exposure existing over a period of years, during which time they have sustained injuries by the inhalation of silica dust. This creates the employer's problem of so-called "accrued" or potential liability. With the enactment of a compensation law, the employer's legal relationship to his employes changes. Prior to the legislative enactment, his liability was that imposed by common law and, as a protection against that liability, there were available his common law defenses. Pursuant to the enactment of the law he is an insurer of the health of his employes, and the law does not concern itself as to when or where or how the injuries were sustained.

In order to avoid this potential liability, many employers, prior to the effective date of the act, have either dischargd previously exposed employes or procured from them agreements whereby the employes waive or limit the benefits of compensation for such injuries as they may have sustained before the act becomes effective. Many of the state laws provide for such waivers, and their use has brought about a serious problem of administration.

To relieve employers from the incentive to remove employes from their jobs and to avoid the use of waivers, provision is made in many of the silicosis compensation laws for a limitation of monetary liability. For example, in Idaho, Michigan, New York, and Ohio there is a limitation in the amount of $3,000; in Pennsylvania, $3,600; in Indiana, $5,000. Such provisions make insurance coverage available to the employer at rates within reason, enabling him to retain in employment men who have been exposed to silica dust, and avoid the use of waivers so that compensation may be available to all employes who sustain disabling injuries.

Although my professional interest in the matter of silicosis compensation legislation has been on behalf of employers, I must confess that legislative provisions limiting an employer's liability for totally disabling silicosis and permitting the use of waivers to similarly limit such liability are repugnant to my sense of fair play and justice to the injured employe. The greatest vice of silicosis compensation legislation has been the allowance of compensation for partial disability; with respect to total disability, I believe that no distinction should be made between the compensation of total disability for silicosis injuries and compensation for total disability from any other occupational disease injury or traumatic injury. An employe is just as much entitled to full compensation from a totally disabling silico-tuberculosis as he is from any totally disabling traumatic injury. However, the problem of accrued liability is real and must be taken into consideration. Some method should be devised to permit the employer to absorb that liability over a period of years after the act becomes effective. This has been done in many states by a method of progressive liability limitation.

For example, under the Maryland law, which became effective June 1, 1939, an employe who suffered total disability during the month of June, 1939, was limited to a benefit of $500. This liability increases at the rate of $50 for each succeeding month, until the full benefits of the act are reached. In other words, if an employe becomes totally disabled during June, 1940, the employer's liability is limited to $1,100, and so on throughout the successive years. This plan provides for the gradual, rather than immediate assumption by the employer of this total liability. I know that the plan is working successfully in Maryland and am pleased to report that under the law of that state there has not been a single reported instance of the discharge of an employe by his employer prior to June 1, 1939, because of the potential liability imposed by the Maryland Occupational Disease Law. In view of the experience of several of the other states where employes were either discharged or forced to sign waivers before the act became effective, I believe that such a provision

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of progressive liability may well answer this legislative problem.

Limitations for the Aggravation of an Existing Liability not Otherwise Compensable.—A subject that has not received the legislative consideration that has been merited is that of apportioning disability when a compensable injury is aggravated by disease following such injury or when an occupational disease is aggravated by another disease or infirmity not in itself compensable.

Many of the state laws provide that where an occupational disease is so aggravated by another disease or infirmity, the administrative agency must determine the portion of disability that is compensable and limit the compensation to such disability, without allowance for the aggravation by some other disease or physical defect. This is true of traumatic as well as occupational disease injury. A simple illustration of the point I am seeking to emphasize would be represented by the aggravation of a traumatic injury by such a disease as arthritis. With respect to silicosis compensation, the best illustration is that where disability or death results of the infection of tuberculosis, pneumonia or other disease.

Under no state law is tuberculosis, as such, recognized as a compensable occupational disease. Therefore, under the laws to which I have just referred, our administrators are required to apportion the disability of the claimant so that the compensation paid is not paid for the injury resulting from the infection of tuberculosis or other disease. Here again, we have the problem of attempting to evaluate a portion of disability—namely, that arising from the compensable disease and that arising from the non-compensable disease.

I state this problem but do not profess to know the answer. To me it is one of the strongest arguments in favor of legislative provisions that empower a medical board to determine controverted medical questions and to evaluate disability, making final the decisions of such boards. The questions so presented to the medical board would be most perplexing, and could not be solved by any method other than guess work by an agency comprised of laymen, lawyers, judges or jurors. Frankly, I do not believe that most of the laws now on the statute books make even an intelligent approach to this most important problem. Injustices are apparent. Employers have been and will be subject to the payment of full disability benefits where the occupational disease is complicated or aggravated by some non-compensable disease. Employes may have their compensation for a compensable disease limited by the existence of a non-compensable disease. It is evident, therefore, that many of our state laws must be amended and corrected in order to solve this problem.

II. Federal Legislation

I would like to call your attention to Senate Bill 2256, introduced by Senator Murray in the Federal Congress on April 25, 1939. The purpose sought to be accomplished by the bill is disclosed in its first section, as follows:

"That (a) for the purpose of enabling each state (1) to provide more adequate protection to workers and their families from economic losses caused by disability or death resulting from dust diseases, and (2) to promote the prevention and control of industrial health hazards causing dust diseases, there is hereby authorized to be appropriated for each fiscal year, beginning with the fiscal year ending June 30, 1940, a sum sufficient for making the payments hereinafter provided for to states which have submitted and had approved by the Secretary of Labor, state compensation plans and prevention plans."

By definition, the term "dust diseases" includes silicosis and any other diseases caused by the inhalation of dust particles.

The bill further provides that a state compensation plan shall not be approved by the Secretary of Labor except upon the following conditions:

1. That the plan provide for compulsory workmen's compensation coverage by insurance methods deemed by the Secretary of Labor to be satisfactory.
2. That it provide for the payment of compensation for silicosis injuries equal to compensation for accidental injuries.
3. That it prohibit waiver of disability benefits by workers.
4. That it provide procedural safeguards to insure prompt payment of benefits.
5. That it provide for compulsory reporting by employers of all dust diseases.
6. That it prohibit discrimination with respect to hire or tenure of employment by employers against any person on the ground of his previous exposure to dust disease hazards.
7. That it provide for state expenditures adequate to insure the efficient administration of the state law.

It further grants to the Secretary of Labor of the United States broad discretionary powers with respect to the approval of plans for prevention, the details of which are too many for specific reference at this time.

This bill did not pass at the last session of the Federal Congress but it will probably be pressed at the next session and an effort will be made to procure its enactment. I trust that it will not become law.

In my opinion, the purposes sought to be accomplished by this bill could be better accomplished by legislative action of the several states rather than by an act of the Federal Congress. The subject matter of this bill is peculiarly within the province of state jurisdiction. Industrial conditions within the states vary and, in designing occupational disease compensation legislation, consideration must be given to the particular problems, industries, standards of living and wage scales that prevail in a given state.

The United States Public Health Service has been most effective in its activities to assist the various state agencies in all phases of the silicosis problem, and those of us who have had any experience with that service realize the tremendous benefits that it has extended to all classes. The Federal Department of Labor has justly emphasized the problem of silicosis in industry, and full credit should be given to its activity in this respect. However, I believe it would be unfortunate if a law of this type were enacted, because it would serve to remove the emphasis that is at present being given to silicosis compensation in the individual states. The problem is a local one and can best be solved by the activities of state agencies. The cost of such compensation should fall primarily upon those industries where the hazard exists and not upon the taxpayers generally. Let the state laws provide reasonable and adequate compensation, regardless of its costs, and assess that compensation to those industries directly affected by such laws.

Conclusion

In conclusion, I regret that limitations of time have not permitted detailed discussion of many of the subjects that are involved in occupational disease legislation. The more we study these problems, the more we come to realize how little we know about them and how much must be learned in order for the administration of these laws to be successful. The laws enacted to date may not be perfect, but they merit a fair trial. Employers, employes, and insurance carriers should cooperate in their administration. If defects exist, they can be corrected by legislative amendments. The public generally has adopted a saner attitude with respect to occupational disease compensation legislation in the past few years than has heretofore existed, and I feel that with the full cooperation of all interests affected, the administration of these laws should prove to be successful.

The Wilshire Oil Case and the Mining Industry

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Many inquiries have come to the American Mining Congress as to the possible significance of the Supreme Court's recent decision in the Wilshire Oil Company case, on the power of the Treasury Department to promulgate regulations for the computation of percentage depletion. Mining Congress Journal considers itself privileged to present to its readers herewith a scholarly analysis of this whole subject by a leading authority in the field of administrative law.—Editor's Note.

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AS IN the case of mines, Section 23(l) of the Revenue Act of 1928[1] authorizes, as a deduction in computing net income, a reasonable allowance for depletion of oil and gas wells. Percentage depletion for oil and gas wells is provided for in Section 114(b)(3) of the Revenue Act of 1928,[2] which grants a specific allowance of 27½ per centum "of the gross income from the property" with the limitation that the allowance "shall not exceed 50 per centum of the net income . . . from the property."

The Supreme Court of the United States, on November 6, 1939, decided in the Wilshire Oil case,[3] that intangible development costs, treated as deductible expense by the taxpayer[4] in computing its taxable net income, must also be deducted in computing and applying the 50 percent limitation. In an opinion by Mr. Justice Douglas, the Supreme Court held that Article 221(i) of Regulations 74, requiring the deduction, was valid; and found statutory power to prescribe the Regulations in Section 23(l) of the Revenue Act of 1928.

The decision has no direct application to the mining industry. The mining industry has never been granted the election to capitalize or expense development costs, and has consistently deducted, in the computation of the limitation upon percentage depletion, all development costs which are properly chargeable to expense. The decision does not affect the distinction between development costs and other expenditures; the proper treatment of expenditures made before the property reaches the productive stage; the deductibility of deferred charges as operating expenses; the distinction between capital expenditures recoverable through depreciation and those recoverable through depletion;[5] nor the present rule that in the depletion computations regarding a particular property only the expenses attributable to that property should be deducted; and in computing the depletion allowance, the net income of one property should not be charged with expenses on other property.

Accordingly, if the decision merely settled one more controversial issue,[6] I should not be disposed to comment, despite the fact that those of us personally familiar with the legislative and administrative history of the provisions might be somewhat surprised. However, much of the opinion is devoted to a discussion of the power to prescribe Regulations, the legal effect of Regulations, the power to amend Regulations, and legislative approval of Regulations. As I have indicated, the opinion seems to be founded upon the statutory power granted the Commissioner in Section 23(l) of the Revenue Act of 1928, to prescribe Regulations under that section—notwithstanding the fact that the only issue involved in the case was the interpretation of Section 114(b)(3). A brief analysis will locate the cause of the confusion.

The Revenue Acts grant power (to the Commissioner, with the approval of the Secretary) to prescribe two distinct types of Regulations:[7]

(1) *Interpretative Regulations.*—Such Regulations merely state the Treasury's construction of the statute. Substantially all the Regulations are of this type.[8]

(2) *Legislative Regulations.*—This type of Regulation prescribes for the future, within the scope of the prescribed statutory standard, a rule of general application. The delegation of legislative power of this kind has long

[1] See also corresponding provisions of each succeeding Revenue Act.

[2] See also corresponding provisions of each succeeding Revenue Act. Percentage depletion for oil and gas wells was first enacted in §204(c)(2) of the Revenue Act of 1926, and for mines in §114(b)(4) of the Revenue Act of 1932.

[3] *Commissioner v. Wilshire Oil Company*, 308 U. S. . . .; and *F. H. E. Oil Company v. Comsioner*, 308 U. S. . . .

[4] In the case of oil and gas wells (but not in the case of mines), the Treasury Regulations permit the taxpayer to elect either to deduct intangible development costs as an expense or to capitalize them. See, Art. 223, Regs. 45 (1920 Edition); Art. 223, Regs. 62; Art. 225, Regs. 65; Art. 223, Regs. 69; Art. 243, Regs. 74; Art. 236, Regs. 77; and Art. 23(m)-16, Regs. 86, 94 and 101.

[5] See Memoranda submitted by the American Mining Congress to the Bureau of Internal Revenue, under date of January 23, 1934, July 25, 1934, and February 2, 1939; and see G.C.M. 13,954, XIII-2, C.B. 66.

[6] The Board of Tax Appeals and the Ninth Circuit decided in favor of the taxpayer on this issue. (*Wilshire Oil Company*, 35 B.T.A. 450, affd. 95 F.(2d) 971 (C.C.A. 9th, 1938)) The Fifth Circuit decided this issue against the taxpayer. (*Commissioner v. F. H. E. Oil Company*, 102 F. (2d) 596 (C.C.A. 5th, 1939)) To resolve this conflict, the Supreme Court granted certiorari. (306 U.S. 628, April 3, 1939)

[7] It is not necessary for present purposes to discuss two other types of Regulations: Procedural Regulations, such as those specifying the form and content of returns (§51, Rev. Act of 1938); and administrative Regulations, governing purely internal affairs of the Bureau of Internal Revenue (R. S., §161.)

[8] Sec. 62, Rev. Act of 1938, is a typical grant of power to prescribe interpretative Regulations.

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been recognized.[9] But grants of legislative power in the Revenue Acts are very few. Congress has been cautious and perhaps too niggardly in this respect. The specific power to prescribe such Regulations must be found in the statute, and should be accompanied by a standard or guide adequate to permit the courts to control the administrative action.[10] If the Congress is to remain in control and if its policies are to be carried out, the power to prescribe legislative Regulations must not be based upon inference, implication, or transfer. Certainly consent of counsel cannot confer it.[11] In the enactment of Revenue Acts, Congress has consistently followed but one practice: The power is invariably found in the specific provision under which the legislative Regulations are to be prescribed.[12] But no such power is found in the statutory provisions relating to percentage depletion.[13] The policy of percentage depletion was adopted by the Congress over the objections of the Treasury. And I suspect that the Members of Congress would be shocked to discover that they had delegated power to the Treasury to define and prescribe the details of that policy.

There are significant and important differences in the legal effect of the two types of Regulations. The differences seem obvious, if the two types are properly distinguished. The more important differences may be outlined as follows:

(1) *Legal Effect.*—The Treasury's construction of the statute, as set forth in interpretative Regulations, is binding as a matter of law (it is too often *not* binding as a matter of practice) upon the Treasury's officers and agents; but it is not binding upon taxpayers. In other words, the Treasury's "guess" as to what the law means has no more legal effect than a taxpayer's. In the final analysis, it is the law and not the interpretation of it which must be followed. Legislative Regulations, on the other hand, are binding upon everyone, the Treasury and taxpayer alike. They have precisely the same effect as if Congress itself had written the provisions into the statute.[14]

(2) *Judicial Review.*—Interpretative Regulations are subject to unlimited review by the courts. The ultimate question is: What does the statute mean? The contemporary interpretation of the statute by the Treasury is, and should be, given weight by the courts.[15] It is sometimes helpful but is never controlling. However, in the case of legislative Regulations, the questions for judicial determination are, whether the delegation of the power was valid,[16] and whether the Regulations are within the delegated power.[17] The courts will not and should not substitute their opinion for that of the administrative officials in determining the policy of the legislative Regulations.[18]

(3) *Power to Amend.*—Inasmuch as interpretative Regulations merely state the Treasury's construction of the statute, it is essential that it have the power to change its construction at any time, both prospectively[19] and retroactively[20]—assuming that its construction has not become "frozen" into the statute, by legislative approval. As a matter of policy, the Treasury is given power to apply its changed construction prospectively only;[21] and, as a matter of policy, the Treasury could and should do more to prevent retroactive application of its changed interpretations. But if the Treasury's construction of the statute has received legislative approval,[22] by reenactment of the statutory provision without material change, then the interpretation has become fixed;[23] and the Treasury has no more power to change the meaning of the statute than it has to change the wording of the statute itself.[24] The Congress, as well as taxpayers, relies upon administrative construction. If the Treasury becomes dissatisfied, it should submit its recommendations to the Congress.

But the power to amend legislative Regulations involves quite a different problem. So long as the Regulation is within the power granted, there is, and should be, no limitation upon the power to amend legislative Regulations prospectively. New problems and constantly changing conditions require prospective amendments. And the grant of power is a continuing grant. A retroactive amendment, however, of a legislative Regulation stands on a different footing. The retroactive application of an amendment of a legislative Regulation, precisely as in the case of the retroactive application of a statute, should be avoided; and, as in the case of a statute, an amendment of a legislative Regulation should be construed, if at all possible, to have prospective application only.[25] As a matter of policy, an administrative official should not have power to amend retroactively a legislative Regulation adverse to the individual. As a matter of law, it would seem sound to require specific statutory authority. The Revenue Acts contain no such delegation of power. In any event, any attempt by Congress to delegate such a power to an administrative official would necessarily be subject to the same rigid limitations which the due process clause imposes upon retroactive legislation by Congress. Axiomatically, Congress can delegate no greater power than it itself possesses.

(4) *Legislative Adoption.* — The proper interpretation of the statute is frequently affected by interpretative Regulations which have received legislative approval by the reenactment of the statutory provision in question, without material change.[26] But again, the question is: What does the statutory provision mean?[27] The Treasury has placed its interpretation upon the provision. This interpretation has been applied over a period of time. It may

[9] See, *Hampton, Jr., & Co. v. United States*, 276 U.S. 394, 406 (1928); *Norwegian Nitrogen Products Co. v. U. S.*, 288 U.S. 294, 305 (1933). *Cf. Panama Refining Co. v. Ryan*, 293 U.S. 388 (1933). Note the detailed discussion in S. Rept. No. 960 (70th Cong., 1st Sess.), p. 16.

[10] *Mahler v. Eby*, 264 U.S. 32 (1924). See *Panama Refining Co. v. Ryan, supra*, 414-420. The complete lack of a standard in §23(1) has caused many of us to be concerned, but as yet there has been no cause to contest seriously the existing Regulations.

[11] See first sentence of the last paragraph of the opinion.

[12] Examples of legislative Regulations are: The Regulations applicable to consolidated returns (§114, Rev. Act of 1928, and corresponding provisions of each of the succeeding Revenue Acts); the Regulations with respect to the use of inventories (§22(c), Rev. Act of 1928, and corresponding provisions of prior Revenue Acts); and the Regulations with respect to the reasonable allowance for depletion (§23(m), Rev. Act of 1938, and corresponding provisions of prior Revenue Acts—such as §23(l) of the Revenue Act of 1928, referred to in Mr. Justice Douglas' opinion).

[13] Sec. 114(b)(3), Rev. Act of 1938, applicable to depletion for oil and gas wells, and §114(b)(4), applicable to depletion for coal mines, metal mines, and sulphur mines and deposits. The corresponding provision of the Revenue Act of 1928—§114(b)(3)—is the provision specifically involved in the *Wilshire Oil* case.

[14] *Shields et al. v. Utah Idaho Central Railroad Co.*, 305 U.S. 177, 180 (1938).

[15] *Southern Pacific Co. v. U. S.*, 307 U.S. 393, 401 (1939); *Armstrong Paint & Varnish Works v. Nu-Enamel Corp.*, 305 U.S. 315, 329-30 (1938).

[16] *Panama Refining Co. v. Ryan, supra;* and *A. L. A. Schechter Poultry Corp. v. U. S.* 295 U.S. 495 (1935).

[17] *Pacific States Co. v. White*, 296 U.S. 176, 186 (1935); *Radio Commission v. Nelson Bros. Co.*, 289 U.S. 266, 276 (1933); *Lynch v. Tilden Co.*, 265 U.S. 315 (1924).

[18] See *Radio Commission v. Nelson Bros. Co., supra*, 277; *N. Y. Central Securities Corp. v. U. S.*, 287 U.S. 12, 24 (1932).

[19] *Morrissey et al. v. Commissioner*, 296 U.S. 344, 355 (1935).

[20] *Manhattan General Equipment Co. v. Commissioner*, 297 U.S. 129, 134-5 (1936).

[21] Sec. 1108(a), Rev. Act of 1926 as amended by § 605, Rev. Act of 1928.

[22] See discussion under (4), *infra.*

[23] See *U. S. v. North Dakota-Montana Oil Co.*, 288 U.S. 459 (1933); *Helvering v. R. J. Reynolds Tobacco Co.*, 306 U.S. 110, 116 (1939). *Cf. Squibb & Sons v. Helvering*, 98 F. (2d) 69, 70 (C.C.A. 2d, 1938).

[24] See Brandeis, J., in *Campbell v. Galeno Chemical Co.*, 281 U.S. 599, 610 (1930).

[25] See *Miller v. U. S.*, 294 U.S. 435, 439 (1935).

[26] *Helvering v. Winmill*, 305 U.S. 79, 83 (1938); *Helvering v. Bliss*, 293 U.S. 144, 151 (1934); *McCaughn v. Hershey Chocolate Co.*, 283 U.S. 488, 492 (1931); *Brewster v. Gage*, 280 U.S. 327, 337 (1930).

[27] See *Koshland v. Helvering*, 298 U.S. 441, 447 (1936). Where the law is plain the subsequent reenactment of a statute does not constitute adoption of its administrative construction. *Biddle v. Commissioner*, 302 U.S. 573, 582 (1938).

(*Continued on page 54*)

With the COAL DIVISION

of the AMERICAN MINING CONGRESS

KNOTTY OPERATING PROBLEMS DISCUSSED AT SUCCESSFUL ANNUAL CONFERENCE

THE Fifth Annual Conference of the Coal Division of the American Mining Congress, held at the William Penn Hotel in Pittsburgh, November 17, was the most successful yet held. Over 100 mining men and manufacturers addressed their attention during the day to analysis of knotty operating problems facing coal mine operators with respect to roof action, mechanical loading, conveyor mining, power, surface preparation, safety, haulage roads and mine drainage.

The Committees of the Coal Division are continuing their studies on the above phases of mining, and the purpose of the Annual Conference is to bring members together for an interchange of ideas and discussion as to how their work can be made of greater help and interest to operating men. Committee reports and open discussions at these meetings continue to bring out many valuable points, and it is a real incentive to witness the sincere and industrious deliberations of such a large group, all working together in a common cause for the advancement of coal mining.

Reports of the Committees studying the subjects listed above were completed at individual sessions in the morning, and were presented to the entire Division in the afternoon (see summaries of reports which follow).

A banquet concluded the Conference, at which brief remarks were made by Harry M. Moses, president of the H. C. Frick Coke Co., and national chairman of the Program Committee of the 1940 Coal Convention of the American Mining Congress; Dr. L. E. Young, Pittsburgh Coal Company; C. A. Garner, vice president, Jeddo-Highland Coal Company, representing the anthracite industry; J. W. Woomer, general manager, Warner Collieries, and chairman of the newly created Mine Water Clarification Committee of the Mining Congress' Coal Division; President Chas. A. Lawall of West Virginia University; Frank E. Mueller, vice president, Roberts & Schaefer Company, and chairman of the Manufacturers Division, and E. R. Price, general superintendent, Inland Steel Company. In the unavoidable absence of R. L. Ireland, Jr., president of the Hanna Coal Company, and chairman of the Coal Division, Julian D. Conover, secretary of the American Mining Congress, served as toastmaster.

In a brief statement preceding introduction of speakers, Mr. Conover said, in part:

"Many of you have participated in this work since activities of the Coal Division Committees were begun five years ago. We didn't know then whether or not we were on the right track, but we have seen this Division's work grow and become more important to the industry each year, and we are very much gratified at the enthusiasm and interest shown.

"We do feel that this work has a real significance to the coal industry. We feel there is a vital need for it, and that it has played a tremendously important part in the movement to help the coal industry hold its place in the sun. We know we are up against some pretty serious troubles and some stiff competition. We produce the finest fuel in the world, but we have difficult mining problems and heavy labor costs, and it is imperative that we have new tools, that we learn better how to use them, and that we constantly develop better methods of mining if we are to meet this competition."

In concluding a brief report of action taken by the Committee on Mine Water Clarification, chairman J. W. Woomer stated: "I feel that as the years go on we will have a setup that will provide a flow of factual information for your files, so that you and others in the industry will be able to present before any legislative body the facts about the economics of the whole situation which will be beyond question."

As chairman of the Program Committee for the coming Coal Convention, Harry Moses expressed grateful appreciation of the time and effort spent by members of the state and district committees in accomplishing such a splendid piece of work. He lauded the work of the Coal Division Committees and the American Mining Congress in the following words:

"For the past two years I have had a fine opportunity to see these conference committees, and have read of your work in the JOURNAL after you presented your reports here. I can't help feeling that the American Mining Congress contributes a great deal more to this industry that many of us have realized.

"I have had an opportunity to see another thing that never occurred to me before. It is so common in our industry and in our business that I think we perhaps get used to it—namely, the generosity of the people who live, work and have their being in this industry—the generosity with which they give their time, efforts, ability and brains to working out the problems of the industry, writing papers and articles about them, and then just giving them to the industry, saying, 'All right, you take them.'

"We read these articles and store them in our mind for reference, and I wonder how many of us have thought about the laborious hours of toil that have been put into this research, and are then just given to you in MINING CONGRESS JOURNAL and other trade papers.

"At this time I want to pay tribute to what I think is the most important thing the American Mining Congress contributes to the coal industry, and that is their staff and their willing service, their magazines and their bulletins for publication of the results of your work and that of leading operators who are willing to share with others the results of their valuable experiences. . . . I think agencies before the American Mining Congress contributed some, but the greatest cooperative agency we have ever had in developing mutual interchange of ideas is the American Mining Congress."

In closing, Mr. Moses urged all present to attend the Cincinnati Convention, saying, "I hope to see you all in Cincinnati in April. I hope you can come on the 29th and stay through. I hope our business is as good as now or better, and I am sure that from the splendid cooperation I have received from all of you in assembling the pro-

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Nearly 100 coal operators and manufacturers gathered together at the Coal Division's Annual Dinner

gram, we will have a most successful and worth while meeting."

All other speakers were unanimous in lauding committee members for their spirited cooperation, and in also stressing the beneficial results to coal mining springing from their work.

REPORTS OF COMMITTEES TO THE GENERAL CONFERENCE

Committee on Underground Power

The Committee on Underground Power, under the chairmanship of C. C. Ballard, has started a series of studies on various phases of power applications in coal mining, and several progress reports were submitted on reports which are now under way.

J. O. Cree presented three charts compiled from typical mines, showing how the total power used is distributed between the various operations, such as cutting, gathering, haulage, cleaning, etc., and including the AC transmission and transformer loss. A study of this kind serves to indicate how economies can be made in power use and distribution.

H. P. Chandler submitted charts showing the importance of adequate rail bonding for the return circuits, and illustrating the extent to which inadequate bonding reduced the voltage at the working faces. The charts stressed the fact (often overlooked) that return lines were just as necessary for efficient operation as the feeder lines, and showed in dollars and cents the relationship between the cost of bonding and the cost of the power loss.

F. L. Stone submitted a brief report on "Installation of Sub-stations on the Surface and Underground." This enumerated the points to be considered in the selection of the proper sub-station location, including material involved, transportation of equipment, and other general factors. F. P. Brightman supplemented the report with a more detailed account, citing examples of how the different types of equipment and line material enter into this problem, and how power losses occur through not having the sub-station within a reasonable distance of the working faces.

A. L. Johnston presented a drawing of the standards for figure 8 and deep grooved trolley wire recently recommended by a joint committee of the N. E. M. A., and explained the advantages of these standard sections over the non-standard shapes and sizes.

The following committee members were present: C. C. Ballard, The New River Coal Co. (chairman); F. P. Brightman, General Electric Co.; H. P. Chandler, Ohio Brass Co.; J. M. Connor, Allegheny Pittsburgh Coal Co.; J. O. Cree, West Virginia Engineering Co.; J. R. Guard, Rochester & Pittsburgh Coal Co.; A. L. Johnston, Electric Railway Equipment Co.; J. C. Metcalfe, Clearfield Bituminous Coal Corp.; H. A. Randall, Harwick Coal & Coke Co.; D. E. Renshaw, Westinghouse Electric & Manufacturing Co.; W. F. Roberts, Jeffrey Manufacturing Co.; F. L. Stone, General Electric Co.; and C. E. Wissinger, Whiteman & Co., Inc.

Committee on Surface Preparation

The Committee on Surface Prepation, T. W. Guy, chairman, submitted three reports that are now in process of preparation.

A screen data sheet prepared by G. R. Delamater and published in the August issue of MINING CONGRESS JOURNAL was shown to indicate the many factors which must be taken into account in designing and selecting the equipment for a modern coal screening plant. The data sheet as originally submitted was modified to some extent by the committee, and it was emphasized that the purpose of this report was not to serve as a questionnaire but merely to call attention to the items necessary to give sufficient information for an intelligent recommendation for a screening installation.

D. H. Davis described the work which was being done by the Subcommittee on Dewatering. He explained that considerable investigation was now under way to reduce the moisture content of stoker sizes, and mentioned that the addition of certain chemicals to the water used in coal washing had a marked effect in aiding the dewatering process. This development is still in the process of experimentation, but definite data may be expected soon.

Mr. Guy submitted charts showing studies on efficiency of screening small sizes. A preliminary report of this subject had recently been published in MINING CONGRESS JOURNAL showing how a screen test, along the lines illustrated by the report, could correct existing inefficiencies and increase the market value of the prepared product.

Committee members present included: T. W. Guy, consulting engineer (chairman); D. H. Davis, Pittsburgh Coal Co.; G. R. Delamater, The W. S. Tyler Co.; A. C. Dittrick, Hanna Coal Co., of Ohio; Jas. M. Godwin, Pocahontas Land Corp.; J. M. Gonder,

Koppers Coal Co.; H. F. Hebley, Pittsburgh Coal Co.; D. L. McElroy, West Virginia University; S. G. Maurice, Allegheny River Mining Co.; Frank E. Mueller, Roberts & Schaefer Co.; C. W. Waterman, McNally-Pittsburg Manufacturing Corp. and J. D. Martin, United Engrs. & Constructors.

Committee on Mechanical Loading

The Committee on Mechanical Loading under the chairmanship of Newell G. Alford, submitted a recommended form sheet prepared by S. M. Cassidy showing a repairman's daily work report and also a form to be used by the face foreman for daily repair requests. Mr. Cassidy, in explaining these sheets, stressed the importance in a mechanical loading operation of preventing delays from machinery breakdowns during the shift, and stated that the use of these two forms had been found very effective in setting up a system whereby repairs can be made before failures occur.

A sub-committee under W. R. Cuthbert is completing a report to explain the use of the time study summary submitted some time ago.

A new sub-committee consisting of S. M. Cassidy, Chairman, W. R. Cuthbert, and E. W. Potter was appointed to prepare a report on cost keeping for mechanical loading. The purpose of this sub-committee is not to design a standard cost form, but to show all items which enter into the operation and which must be included in determining the actual cost. A further object is to encourage uniform practices in cost keeping among companies using mobile loading machines.

Members of the committee present were: Newell G. Alford, Eavenson Alford & Auchmuty (chairman); R. S. Bigelow, Goodman Manufacturing Co.; S. M. Cassidy, Weirton Coal Co.; W. R. Cuthbert, Pittsburgh Coal Co.; C. W. Gibbs, Harwick Coal & Coke Co.; Edwin H. Johnson, Jeffrey Manufacturing Co.; E. W. Potter, Pittsburgh Coal Co.; and C. C. Whaley, Myers-Whaley Co.

Committee on Conveyor Mining

The Committee on Conveyor Mining, T. F. McCarthy, chairman, submitted a progress report on their study of Conveyor Mining Plans. It is the purpose of this study to compile descriptions of typical mining plans used to meet various conditions and to show various conveyor arrangements now being successfully operated. A series of six slides were presented to the Conference to indicate the lines along which the committee is working, and it is expected that this report will be completed in the near future.

A preliminary report on the development of a daily inspection form was submitted by E. B. Gellatly. The purpose of this report is to recommend procedure that will tend to eliminate breakdowns during the shift and to reduce maintenance costs. The report form will be made in the smallest possible size in order to obviate lengthy descriptions by the conveyor foreman.

The committee further announced their plans to develop a recommendation for cost keeping which will enumerate the items to be taken into account when determining a daily or periodic conveyor cost and performance record.

The following committee members were present: T. F. McCarthy, Clearfield Bituminous Coal Corp. (chairman); L. F. Crawford, Goodman Manufacturing Co.; Walter C. Fancourt, Sonman Shaft Coal Co.; E. B. Gellatly, Jeffrey Manufacturing Co.; W. J. B. Mayo, Koppers Coal Co.; J. T. Parker, Inland Steel Co.; L. H. Schnerr, Consolidation Coal Co.; E. A. Siemon, Hillman Coal & Coke Co.; and A. F. Whitt, West Virginia Coal & Coke Co.

Committee on Roof Action

The Committee on Roof Action, under the chairmanship of F. G. Smith, will organize four sub-committees to cover various phases of this subject. A committee will study roof characteristics to classify the various types of roof according to how the top acts, rather than according to characteristics of the roof stratum itself. A second sub-committee will describe roof support materials with particular reference to the qualities of the various materials used. A third sub-committee will collect data on roof support methods illustrating present practices in the design and placement of supports. A fourth sub-committee will study the subject of ground movement, particularly as it affects the roof support in pillar work.

The committee stated that their reports will, as far as possible, eliminate discussions of the technicalities of roof action, and will be presented in such a manner that the average mine superintendent can understand the reports without detailed knowledge of physics or complicated mathematical formulae.

The following committee members were present: F. G. Smith, The Sunday Creek Coal Co. (chairman); E. H. Heald, Jr., Carnegie-Ill. Steel Corp.; A. R. Joyce, Wood Preserving Corp.; A. E. Long, Clearfield Bituminous Coal Corp.; and L. N. Plein, Reconstruction Finance Corp.

Committee on Coal Mine Haulage Roads

The Committee on Coal Mine Haulage Roads, under the chairmanship of R. V. Clay, has started a study on Service Haulage — which includes the tracks from the working face to the main line or the intermediate haulage. Particular attention will be given to recommendations for mechanical loading. A number of haulage layouts as used by operating companies have been collected by the committee, and several of these were shown to illustrate the track problems involved in installing and maintaining an adequate service haulage system for mobile loading machines. Detailed explanations were given by W. W. Dartnell and C. C. Hagenbuch.

Committee members present included: M. D. Cooper, Hillman Coal & Coke Co.; W. W. Dartnell, Hillman Coal & Coke Co.; C. C. Hagenbuch, Hanna Coal Co. of Ohio; Shelly G. Hughes, Differential Steel Car Co.; H. B. Husband, C. & O. Railway Co.; E. H. Jenks, Rochester & Pittsburgh Coal Co.; A. R. Joyce, The Wood Preserving Corp.; J. H. Siebert, Carnegie-Illinois Steel Co., and J. R. Ulrich, Bethlehem Steel Co.

Committee on Safety

The Committee on Safety, under the chairmanship of J. J. Sellers, has for some time had a set of recommended safety rules in process of preparation. These cover all the operations of mining and in addition to general rules, there are special rules covering safe practices with mechanical loading, conveyor mining, etc.

Some of these special rules were submitted to the Conference to illustrate the lines along which the committee is working, and considerable discussion with constructive suggestions followed. The committee explained that their recommendations, before being presented to the industry, were subject to further modifications and would be carefully reviewed not only by the committee members themselves, but by others in the industry who have had wide experience in safety and accident prevention.

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WHEELS of Government

● *As Viewed by A. W. Dickinson of the American Mining Congress*

SCARCELY had the clamor over the "come and get it" Neutrality Act terminated with its passage and approval early in November, when sharp differences broke out between the Maritime Commission and the State Department over the proposed transfers in ship registries from the flag of the United States to other nations and in particular little Panama. Actually and unofficially the President approved of and desired the transfers in order that American shipping lines could continue to handle cargoes into seaports in the belligerent areas; but the opposition of Secretary of State Cordell Hull was so immediate and positive that the controversy, for the time at least, has been allowed to recede. In the meantime many ships and crews are idle.

The New Deal Thanksgiving Day, proclaimed a week ahead of the customary date to speed up Christmas shopping sales, found the President at Warm Springs, Georgia, carving turkey while "Cactus Jack" Garner took to the brush in a second effort to bring down his fall deer-meat. As is usual when the President goes down to Georgia, he gave the newspaper reporters and the country something to think about. This time he spoke of increased taxes for national defense, a surprise statement to many who had heard for some weeks that larger revenues from increased business activity, coupled with cuts in federal spending, would avoid further tax increases in an election year.

The Federal debt now stands at approximately $42,000,000,000 plus $6-7 billions of Federal agency obligations. An additional $2,000,000,000 national defense expenditure plus another $2,000,000,000 deficit for the fiscal year 1941 would push the debt above the $45,000,000,000 statutory limit, and it remains to be seen if the administration will care to make an issue of increasing the debt limit in a campaign year.

Taxation

After adjournment of the special session on November 3 there was a noticeable cooling of Administration sentiment toward work on a revenue bill for 1940. Ways and Means Committee Chairman Doughton said he did not know whether there would be any revenue bill, and the subcommittee headed by Jere Cooper of Tennessee heard Under Secretary of the Treasury John Hanes in executive session and then adjourned until January. Mr. Hanes is said to have told the subcommittee that the Treasury will require the time until January to correlate the information and suggestions on tax procedure which have been received from individuals and associations in response to the Treasury invitation issued in August. A further subcommittee was created to cooperate with the Treasury when necessary in the interim; members are Cooper (Tenn.), Disney (Okla.), Buck (Calif.), Duncan (Mo.), and Woodruff (Mich.).

When the last vestige of the undistributed corporate earnings tax was removed in the 1939 Revenue Act, the Treasury undertook to tighten up on the administration of Section 102 which provides for a surtax on accumulated profits of corporations. Regulations since issued by the Treasury are now the subject of complaint from many sources, and apparently amount to a retention of the objectives sought to be accomplished by the undistributed corporate earnings tax. As an example, the Regulations provide that Treasury representatives can recommend the application of Section 102 where a corporation distributes less than 70% of its earnings to stockholders. In the case of an expanding industrial enterprise such action on the part of the Treasury would entail the retaining of counsel as well as a considerable lapse of time to provide proof that the undistributed money is necessary for development or for expansion of plant and purchase of equipment.

Early in November the Supreme Court handed down a decision in the case of the Wilshire Oil Company, Inc., holding that oil companies, in computing their "net income from the property" for applying the 50% limitation on depletion allowance, must deduct development expenditures if they have deducted such expenditures in determining their taxable net income. The Wilshire Oil Company contended that the Treasury did not have the authority, taken in 1928, to revise the regulations to require that development expenses deducted in computing taxable net income must also be deducted in computing "net income from the property." Supreme Court Justice William O. Douglas held in his decision that the Treasury had broad powers of administrative interpretation, and in this point the case may be of real significance to mining. Elsewhere in this issue is an excellent discussion of this decision by Ellsworth C. Alvord.

On November 10 the Third Circuit Court of Appeals found for the taxpayer in a depreciation case, in holding that depreciation was not to be considered as having been "allowed" where it was merely reported on an income tax return but was not taken as a deduction when income was insufficient. The Court reversed the Bureau of Internal Revenue and the Board of Tax Appeals, and stated that in computing gain or loss from a sale of property, the cost basis of the property sold may not be reduced by depreciation unless the depreciation has actually been taken previously as a deduction against taxable income.

Foreign Trade Agreements

Following the outbursts from Senators and Congressmen in October and early November against the Administration's foreign trade agreement pol-

icy, particularly in the cases of the Canadian, Venezuelan, Argentine and Chilean promulgated or proposed treaties, members of both Houses representing agricultural, stockraising, oil, coal, copper and zinc constituencies have continued their determined opposition to the State Department program. At the oral hearing before the Committee for Reciprocity Information on November 27 and 28 Senators Hayden and Ashurst of Arizona, Johnson of Colorado, Wheeler of Montana and Representatives Cook of Michigan, Bradley of Michigan, Murdock of Arizona and Robinson of Utah registered strong objection to any reduction in the present import excise tax on copper. Senator Johnson said in part:

"Among the nations of the earth we are the only nation deliberately urging the importation of raw materials of which we already have a surplus. Such a grievous policy makes utterly foolish the Wage-Hour Act and the multitude of other legislative efforts to raise the standard of living here."

Senator Wheeler of Montana told the Committee that nothing could do more to discredit the entire reciprocal trade agreements program than a reduction at this time in the excise tax of 4c a pound on imports of copper. He stated that it is perfectly obvious that a cut of 50% in the present import excise tax would reduce the price of copper to about 10½c, "and it would mean that the already too large W.P.A. rolls at Butte would be increased by 3,000 to 4,000 men."

On November 29 came the announcement of a poll taken in the Senate which showed that 57 Senators out of the 96 are in favor of making foreign trade agreements subject to Senate ratification. This number is made up of 32 Democrats, 23 Republicans and 2 Farmer-Laborites, and it is well to remember that a substantial number of these Senators are in favor of terminating the foreign trade agreements power of the State Department by refusing to extend the authority which expires in the Spring of 1940.

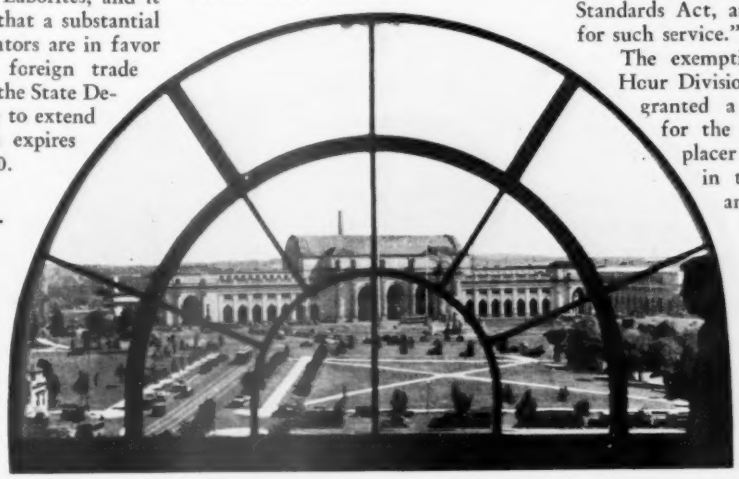
National Labor Relations Board

Assistant Attorney General Thurman Arnold, the anti-trust chief of the Department of Justice, has recently made public the opinion of the Department on certain activities of labor unions which are designated as unreasonable restraints on trade and unquestionable violations of the Sherman Act. Specifically these include restraints designed:

1. To prevent the use of cheaper material, improved equipment, or more efficient methods.
2. To compel the hiring of useless and unnecessary labor.
3. To enforce systems of graft and extortion.
4. To enforce illegally fixed prices.
5. To destroy an established and legitimate system of collective bargaining.

Immediate protest was registered by the American Federation of Labor which includes in its membership the numerous building trade unions that have so long been the cause of strikes and unreasonable stoppages in the construction industry. It is quite apparent that the announced attitude of the Department of Justice plays directly into the hands of the newly created CIO building construction union, which is crusading for membership on the basis of one big union for the construction industry similar to the United Mine Workers of America or the International Union of Mine, Mill and Smelter Workers, in which the individuality of the various trades is submerged.

The Howard W. Smith Committee of the House of Representatives investigating the National Labor Relations Board is working on the correlation of its questionnaire material, and is not expected to begin hearings before February 1, 1940. The Senate Committee on Education and Labor will continue in January with hearings on the proposed amendments by Senator Burke and others to the National Labor Relations Act.



Union Station, Washington, D. C.

Wage-Hour

In the middle of November Secretary of Labor Frances Perkins presided at the Sixth National Conference on Labor Legislation attended by Labor Department officials of the various states as well as by labor union officials and others interested locally and nationally in labor legislation matters. These conferences are held in preparation for activity in the legislatures of the states as well as in the national Congress, and one of the resolutions passed provides that "all phases of labor law administration (including workmen's compensation, safety and health protection, minimum wage, hours, child labor, employment service, unemployment compensation and industrial disputes) be consolidated under one department, a Department of Labor (in each State)." Another resolution calls for adoption of language in the public health bill introduced by Senator Robert Wagner of New York, which will enable State Labor Departments to secure money from the Federal Government to be used in work on industrial hygiene. The report of the Conference further states, "the importance of vigorously pushing State wage and hour laws is now greater than ever. Corporate devices to evade the Fair Labor Standards Act, and the difficulties of defining interstate commerce, are withdrawing some workers from the protection of the Federal law. It is easier to establish Federal-State cooperative relationships for the enforcement of the Fair Labor Standards Act where a State agency has had the experience of administering a State Wage-Hour Law . . . the States, wherever necessary, should pass enabling legislation which will allow them to cooperate with the Federal Department in the enforcement of the Fair Labor Standards Act, and to be reimbursed for such service."

The exemptions section, Wage-Hour Division, on November 15 granted a seasonal exemption for the open-cut mining of placer gold in Alaska and in the "more northerly and higher altitude States" of Idaho Montana, Nevada, Oregon, South Dakota, Utah, Washington and Wyoming. The order per-

(*Continued on page 52*)

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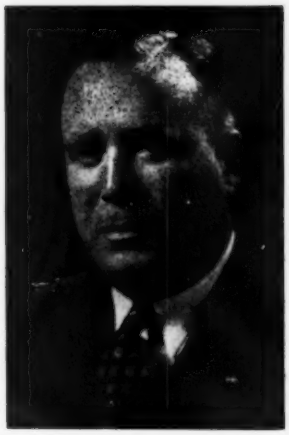
Coal Convention Program Drafted



National Chairman
HARRY M. MOSES
H. C. Frick Coke Co.

A WELL rounded program sure to draw record-breaking crowds to the Seventeenth Annual Coal Convention and Exposition of the American Mining Congress, Cincinnati, April 29-May 3, was drafted by the National Program Committee in Pittsburgh, November 18.

With Chairman Harry M. Moses leading the way, state and district chairmen discussed convention plans, emphasizing need of promoting full attendance at the sessions, then proceeded to the task of choosing specific subjects for convention discussion from the hundreds of suggestions made at the state and district meetings held during October. Those present included: George F. Campbell, Illinois; A. R. Mathews, Kentucky; E. A. Siemon, Pennsylvania; J. J. Sellers (alternating for C. F. Connelly, Virginia); Whitney Warner, Jr., Ohio, and William J. Wolf, West Virginia, in addition to staff members from the Washington office.

The head start of more than two months over previous pre-convention schedules (strongly urged at last year's Program Committee meetings to afford ample time for careful choice of subjects and speakers, and for preparation of the papers themselves), together with the enthusiasm of Chairman Moses and all committee members, insure a slate of papers at Cincinnati that will command widespread attention as a compendium of best thought in modern coal mining practice, together with discussion of certain outstanding economic problems confronting the industry.

Included in the four-day sessions which, together with the peerless exposition of coal mining equipment and supplies assembled by manufacturers, bring together thousands of coal operators from all parts of the country, will be discussions by leading operators on face preparation, mechanical loading, conveyor mining, management, power, roof support, equipment maintenance, surface preparation, safety and national economic problems.

STATE CHAIRMEN

Pennsylvania

E. A. SIEMON
Hillman Coal & Coke Co.

Virginia

C. F. CONNELLY
Kemmerer Gem Coal Co.

Alabama

HAROLD McDERMOTT
Newcastle Coal Co.

West Virginia

WM. J. WOLF
Consolidation Coal Co.

Tennessee

JOHN W. HOWE
Block Coal & Coke Co.

West Central States

H. H. SPENCER
Pioneer Coal Co.

Kentucky

A. R. MATTHEWS
Clover Splint Coal Co.

Illinois

GEO. F. CAMPBELL
Old Ben Coal Corp.

Rocky Mountain States

FLOYD R. POOL
McNeil Coal Corp.

Other chairmen not shown: Indiana—Robt. A. Templeton, Templeton Coal Co.
Ohio—Whitney Warner, Jr., G. M. Warner Collieries Co.

Greater Emphasis on Stripping Problems

In keeping with the importance of strip mining in the production of the nation's solid fuel supply, greater emphasis will be given in 1940 to problems and improved practices in this branch of the industry. In addition to the inclusion of two main papers on coal stripping in the regular program, a special meeting room will be provided at Music Hall where a round table discussion of strip-mining problems will be held at a time when the main session is dealing exclusively with phases of deep mining. This plan has evoked keen interest from leading strip operators, and will undoubtedly result in an unusually fine representation from this group.

State Meetings Held

Well attended district meetings of the State Program Committee were held the week of October 16 in Birmingham (Alabama Committee); Middleboro (Kentucky, Virginia and Tennessee Committees); Charleston (West Virginia Committee); Pittsburgh (Pennsylvania and Ohio Committees); and Chicago (Illinois and Indiana Committees) to determine the desires of each coal producing field for general convention procedure and for subjects to be presented at the sessions. In addition to these meetings, the state chairmen in the West Central States and the Rocky Mountain field contacted their members by correspondence to obtain their specific recommendations.

Prior to these meetings, the American Mining Congress had conducted a letter ballot to secure a cross-section of the industry's opinion as to the phases of mine operation considered most important for analysis at the convention. This ballot was sent to representative coal operators and equipment manufacturers in all fields of the United States, and an unusually high percentage of replies was received.

The accompanying detailed compilation of the results reveals a remarkable agreement as to what are considered subjects of most vital interest to the coal industry today.

The following recommendations concerning general convention procedure were made by the state committee meeting, and were unanimously adopted by the National Program Committee.

COMPILATION OF LETTER BALLOT SELECTING SUBJECTS FOR CONVENTION PAPERS

		Division of Votes from Coal Operators					
	Total Votes	North Appal.	South Appal.	Central States	Western States	Total Opers.	Mining Equip. Mfrs.
Number Votes	188	52	59	26	17	154	34
Subjects *	Percentage of votes received by each subject						
Mechanical Loading	81	85	81	81	95	80	71
Conveyor Mining	72	67	80	61	76	72	71
Safety	69	71	74	65	71	72	56
Equipment Maintenance	68	70	74	58	71	70	56
Face Preparation	62	71	64	65	47	65	44
Surface Preparation	55	58	62	61	47	60	35
Underground Power	54	56	58	61	53	57	41
Management	52	58	54	61	53	56	32
Service Haulage	52	50	54	46	29	49	64
Roof Support	49	56	56	31	64	53	32
Ventilation	36	38	35	38	47	38	21
Main Haulage	32	38	23	23	18	28	50
Vocational Education	32	29	46	23	35	35	17
Cost Accounting	29	38	34	23	12	31	17
Hoisting	14	10	13	23	6	13	17
Drainage	12	8	19	4	12	12	14

* Most of those replying also expressed their desire to have discussion of national economic problems, the specific subjects to be selected at a later date.

Convention Procedure

(1) The 1940 convention will follow the meeting schedule established over the past several years; starting at 10 o'clock Monday morning, April 29, and closing at 4 o'clock Thursday afternoon, May 2, with a morning and an afternoon session on each of the four days.

(2) Three main papers are to be presented at each session, and the Floor Committee will schedule a time for each subject, keeping in mind the relative importance of the subjects and their suitability for floor discussion.

(3) Papers on the same subject are to be given at the same session.

(4) Every effort will be made to have open floor discussion, and in this connection the following recommendations were approved:

(a) That advanced copies or extracts of the papers be sent to discussion leaders in each district to be selected by the state chairman.

(b) That blank cards be distributed among the audience for submission of written question to the speakers.

(c) That each member of the Program Committee take part in the discussion, and encourage others to do so.

(d) That all floor discussions be presented orally and not read.

(5) All committees approved the type of evening entertainment held over the past several years, and recommended its continuance.

(6) All committees approved the Miners' Exhibit, as inaugurated in 1939, and recommended that this be continued as a regular feature of the exposition.

Tentative Program for Subjects and Arrangements of Sessions

MONDAY MORNING, APRIL 29—

Opening address and introductions.
(1) Face Preparatory.
(2) Face Preparatory.

MONDAY AFTERNOON, APRIL 29—

(1) Management.
(2) Power.
(3) Roof Support.

TUESDAY MORNING, APRIL 30—

(1) Surface Preparation.
(2) Surface Preparation.
(3) Coal Stripping.

TUESDAY AFTERNOON, APRIL 30—

(1) Conveyor Mining.
(2) Conveyor Mining.
(3) Conveyor Mining.

WEDNESDAY MORNING, MAY 1—

(1) Equipment Maintenance.
(2) Equipment Maintenance.
(3) Coal Stripping.

WEDNESDAY AFTERNOON, MAY 1—

(1) Mechanical Loading.
(2) Mechanical Loading.
(3) Mechanical Loading.

THURSDAY MORNING, MAY 2—

National Economic Problems. (Subjects and speakers to be selected.)

THURSDAY AFTERNOON, MAY 2—

(1) Safety.
(2) Safety.
(3) Safety.

The tentative program shown herewith was drawn up and approved by the National Committee from specific recommendations as submitted by the State Committees. Invitations to various speakers are now being extended, and plans are being formulated for stimulating open discussions from the floor.

Specific suggestions were made to bring about both an increased turnout of coal operators at Music Hall and a full house at each and every session of the convention.

All indications point to a record-breaking Coal Show in Cincinnati next April. Make your reservations early, and plan to occupy a ringside seat when these subjects are reviewed.

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NEWS and VIEWS

Moses and McAuliffe Honored By Illinois Mining Institute

Over 300 mining men gathered at the Abraham Lincoln Hotel in Springfield, Ill., November 10, for the forty-seventh annual meeting of the Illinois Mining Institute. Climaxing a fine slate of papers presented at the two sessions during the day was the annual dinner, which was featured by the presentation of honorary life membership certificates to Thomas Moses, recently retired vice president of U. S. Steel Corporation of Delaware, and to Eugene McAuliffe, president of the Union Pacific Coal Company.

The morning session was given over to discussion of electrical and maintenance problems, presented by members of the Institute's Mining Electrical Group consisting of 250 members in five southern Illinois counties. "Locomotive Maintenance" was covered by Hector Hall, of Bell and Zoller Coal and Mining Company; "AC and DC Sectionalizing Power Circuits" was discussed by A. G. Shaffer, of Chicago, Wilmington and Franklin Coal Company, and "Loading Machine Maintenance" was presented by C. C. Conway, of Consolidated Coal Company.

Also discussed at the morning session was a report by John E. Jones, chairman of the Committee on Scientific Studies of Physical Conditions and Improved Practical Analyses of the Hazards of Coal Bed and Adjacent Strata Which Affect Safety in Coal Mining in Illinois. Mr. Jones pointed out that virtually no progress had been made in reducing fatalities and injuries brought about by roof falls, and strongly advocated special studies leading to the discovery of scientific methods of determining actual roof conditions, this to be done by the Institute's support of a fellowship or part time professorship in conjunction with some educational institution. After considerable discussion, it was decided that the Institute should strongly advocate this type of work to be carried on as special studies by the U. S. Bureau of Mines, and Mr. Jones was directed to present the case to Washington officials of the Bureau.

In opening the afternoon session, President Paul Weir described action of the Board of Directors meeting the previous day in advocating: (1) A series of district and state-wide first aid meets as an important factor in accident reduction; (2) closer cooperation between the Institute and the coal mining department of the University of Illinois, and (3) a system of vocational education by means of night schools throughout the mining areas in Illinois. A committee consisting of Messrs. McSherry, Herbert and Roy Adams was appointed to follow up actively in promoting the first aid meet program. Mr. J. J. Forbes, well known safety engineer of the Bureau of Mines in Pittsburgh, commended the Institute for pushing this type of program, and Eugene McAuliffe, president of the Union Pacific Coal Company, cited the effective manner in which his company has been able to reduce all accidents. Dr. M. M. Leighton, chief of the Illinois Geological Survey, thanked the Institute members for their active support in advocating extension of the work of the Survey as a distinct aid to the mineral industry of the state.

In a paper entitled "Factors Influencing Blasting," John L. Romig, technical engineer of the Atlas Powder Company, pointed out clearly a number of fundamental factors of importance in most efficient blasting which have been brought out repeatedly by numerous investigations by the company's staff. "Sales Problems Created by Compensation Laws" was presented by Norvin H. Vaughan, district sales manager of Consolidated Coal Company, in which he emphasized the definite need of spreading Illinois production over a longer period, and pointed out the tough sales problems involved in such a program. Dr. Clayton G. Ball, consulting engineer of Chicago, concluded the afternoon session with an analysis of "The Future of Illinois Coal." He emphasized that future utilization will depend more and more on specialization —use of special coals having particular specifications for special uses.

At the well attended annual dinner that evening, certificates of honorary life membership were presented to Thomas Moses and Eugene McAuliffe by President Paul Weir, who also acted as toastmaster. Appropriate responses were given by both Mr. Moses and Mr. McAuliffe.

Roy L. Adams, general superintendent of Old Ben Coal Corporation, was elected president of the Institute for the coming year, and Dr. M. M. Leighton was chosen vice president. B. E. Schonthal was reelected secretary-treasurer.

Members of the executive board elected for the coming year included the following: J. G. Crawford, Valier Coal Co.; D. H. Devonald, Peabody Coal Co.; A. F. Dodd, United States Fuel Co.; G. S. Jenkins, Consolidated Coal Co.; James McSherry, Illinois Dept. of Mines and Minerals; Fred Miller, Franklin County Coal Corp.; M. M. Moser, United Electric Coal Companies; B. H. Schull, Binkley Mining Co.; L. D. Smith, Chicago, Wilmington & Franklin Coal Co.; L. A. Wasson, Wasson Coal Co.; D. D. Wilcox, Superior Coal Co., and W. P. Young, Crescent Mining Co.

Consolidated Coppermines May Build Concentrator

Consolidated Coppermines Corp., is considering the possibilities of financing the construction of its own concentrator, power plant and other necessary equipment, in order to process its ore into blister copper, according to a recent report. Estimates of the amount necessary for such construction range between $4,000,000 and $5,000,000. At the present time the company has a contract with Kennecott Copper Corp. for processing its ore at the McGill smelter of Kennecott's Nevada Consolidated division.

It is estimated that several years would elapse from the time production was started before actual movement of the ore through the concentrator would begin. Consolidated is currently producing at the annual rate of 45,000,000 pounds of refined copper.

Coal Act Amendment Committee Reiterates Purposes

Following a meeting of the Committee to Amend the Coal Act, held in Washington, D. C., November 14, a statement was issued reiterating the purposes of the committee—namely, to bring about repeal of the price-fixing provisions in the Act, the 1-cent per ton tax, and the 30-day contract limitation clause of the Guffey Act. The committee stated that "these purposes can best be accomplished by enactment of the Allen Bill." It is reported that a majority of 17 of the 25 members of the House Committee on Ways and Means favored giving a hearing on the Allen Bill, but that such action is opposed by Administration influences.

With approximately half of the commercial tonnage of the United States still in agreement with the purposes of the committee, the group will endeavor to obtain further support of its program by additional tonnage.

Prominent operators present at the well attended meeting included: Chairman John A. Howe, C. C. Dickinson, J. D. Francis, John D. A. Morrow, James W. Carter, R. L. Ireland, E. M.

Douthet, J. G. Bradley, H. R. Hawthorne, J. Noble Snider, R. E. Jamison, and Arnold Gerstelle.

The full statement issued in behalf of the committee, referred to above, was as follows:

"Plans were discussed in regard to future activity of the committee, and plans made to strengthen the committee and its organization, and to aggressively bring about the relief that is so necessary to the industry. It is our opinion that Government men entrusted with the job of administering this Coal Act now know, or are learning fast, what we have known for some time, that is, that this is definitely an unworkable and terribly costly law, and that it must be amended. We know that it is necessary to have this law amended or repealed, and we think it most advisable that we continue to study the needs of the industry and to scrutinize any future proposed legislation, so as not to again go through the heavy cost and chaotic conditions of experimental laws of this nature."

Michigan Iron Mines Leased to Inland

Inland Steel Company, Chicago, recently announced purchase of mineral lease of the Sherwood property at Iron River, Mich.—an 80-acre tract known to contain extensive deposits of iron ore. The company contemplates establishing a new mine there next summer, and is planning diamond drilling this winter to locate a site for the shaft. It will be the first new mine opened in the Iron River district in ten years.

The Sherwood property has been held in reserve by Republic Steel Corp., 30 years, and more than one million dollars has been spent in royalties, ground rental and taxes, without one ton of ore being mined.

Morton Heads Kanawha Operators

Members of the Kanawha Coal Operators Association elected B. H. Morton of Charleston, W. Va., to the presidency of the organization at the annual meeting held in Charleston October 19. He succeeds C. A. Cabell, who becomes a member of the board of directors.

Other officers are: W. H. Miller of Charleston, vice president; John L. Dickinson of Charleston, treasurer, and D. C. Kennedy of Charleston, executive secretary (re-elected). Directors chosen are: A. W. Pollock, W. H. Pettus, Garner Williams, F. L. Harris, John Laing, Mr. Cabell, F. L. Hornickel and A. S. Wilson.

Featured at the banquet were addresses by Governor Holt of West Virginia, and by Clem Johnson, Roanoke, Va., business man and director of the National Chamber of Commerce. C. C. Dickinson served as toastmaster, and D. C. Kennedy, who has been association secretary since the organization's formation, led group singing.

Mine Car Loader Speeds Up Drifting in Tri-State

In order to speed up driving a 600-foot drift on the 285-foot level of the Grasselli lease of the St. Louis Smelting & Refining Company in the Waco district northwest of Joplin, Mo., the company recently installed a Gardner-Denver mine car loader, according to H. H. Utley, of Baxter Springs, district superintendent of the company.

Although this type of machine has been widely used for several years in other mining fields its application in the Tri-State district represents an innovation. The amount of broken rock that can be handled by the loader will depend largely upon the availability of empty cans, and the arrangements for moving them after they have been loaded.

Examiner Appointed For Philadelphia and Reading Coal

Nicholas G. Roosevelt, banker and engineer, was recently appointed examiner of the Philadelphia and Reading Coal and Iron Co., now in reorganization proceedings under Section 77B of the Bankruptcy Act, by Federal Judge W. H. Kirkpatrick at Easton, Pa.

Mr. Roosevelt announced he would start his work early in December. In effect, he will sit in place of the judge, and will examine the company's property, its financial condition, the operation of its business and desirability of continuing it and any other matters which may be referred to him by the court as relevant to the formulation of a plan of reorganization.

Mexican Tungsten Supply Contracted for by Molybdenum Company

Development of large deposits of tungsten recently discovered in the Ocampo district, State of Coahuila, Mexico, some 70 miles south of Eagle Pass, Tex., will soon be started on an extensive scale. Contract for the output has been made with Molybdeum Corporation of America, the agreement calling for delivery of the tungsten ore at Eagle Pass, Tex., where it will be treated in a concentrating plant to be constructed, and then shipped to smelters in Pennsylvania.

T. C. I. Contracts For Sale of Coke

Tennessee Coal, Iron and Railroad Company recently completed arrangements with the long-idle Semet-Solvay Company in Birmingham, Ala., for 800 tons of coke a day, T.C.I. to furnish the coal. Resumption of operations by Semet-Solvay was scheduled for mid-November.

At the same time, T.C.I. also announced that the Docena coal mine, previously on a three shifts per week basis, would go on five shifts effective November 20.

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SUBPOENA PROPOSAL EVOKES PROTESTS

● *Drive is on to Conclude Coal Division Hearings on Proposed Minimum Prices*

With the slogan "Out of the trenches by Christmas" as a by-word, officials of the Bituminous Coal Division of the Interior Department are driving ahead in an endeavor to conclude the hearings (now in their sixth month) on proposed minimum coal prices. Meetings were recessed from November 3 to November 13 because of the illness of Dr. C. J. Potter, assistant chief of the Division's Marketing Section and ace Government witness.

Following the Carter Coal Company's motion and application to subpoena Division Director Howard Gray to furnish confidential data on spot orders, contracts, invoices, credit or debit memoranda of individual producers, etc., a flood of protests have come in from other producers objecting strenuously to this proposal. Principal point raised by protestants is that such data are valuable private property and were submitted with the strict understanding that they would be held in confidence—that their disclosure would seriously affect their business, and permit competitors to inflict irreparable damage, contrary to the spirit and intent of the law. The motion was denied by Examiner Lewis late in November.

Meanwhile, testimony has been presented at the hearings on proposed prices: (1) in Market Areas 200 to 212, including North and South Dakota, Nebraska, Kansas, Oklahoma and Texas—an area characterized by Dr. F. G. Tryon of the Division's staff as a "competitive battle ground in which Rocky Mountain coals coming east divide the market with middle western or Appalachian coals moving west"; (2) for railroad fuel and by-product coal; and (3) for lake, river and ex-river coal. Testimony has also been given on realization in connection with proposed price schedules, with Dr. F. G. Tryon presenting the government case, and on wholesalers' discounts. Extensive cross examination by district board and producer representatives followed testimony by Division witnesses.

Late in October Examiner Thurlow Lewis in a sharp statement criticized district boards for their request to postpone direct evidence on midwestern prices for Market Areas 15 to 75 until a later date; he expressed disappointment that, instead of showing a willingness to "put their cards on the table," there was an apparent disposition not to reveal them "until the other fellow showed his."

Action of the Supreme Court in refusing to consider the city of Atlanta case charging unconstitutionality of the Guffey Act, and in turning down the Sunshine Coal Company's petition for exemption from the Act apparently removes from the courts the final possible threats of blocking promulgation of minimum prices by court injunction.

With the slate of work still pretty well filled, Secretary Ickes' prediction that minimum prices might be out by January 1 "if we can proceed in an orderly and regular manner" would appear to be wishful thinking. Many who have been following the hearings closely believe that prices couldn't have been gotten out by that date, even had the hearings been concluded in mid-November.

Larger Capacity For Silver Dollar Mine

Silver Dollar Mining Company started improvements in November at its mine in the Coeur d'Alene district of Idaho which will eventually double the ore handling capacity of the plant.

Improvements are all underground, the shaft station having been enlarged to accommodate a new combination cage and skip having a capacity of one and one-half tons, with an automatic dump attachment. This equipment will facilitate handling muck from the lower levels, and will double the ore handling capacity when the mine is ready for it.

Operations at the company's Galena mill are proceeding on the regular schedule of 75 tons of feed per day.

Heavy Anthracite Shipments To Canada

Commenting recently on the current anthracite situation, Louis C. Madeira, III, executive director of the Anthracite Institute, stated: "Canada imported the greatest tonnage of Pennsylvania anthracite in September that she has taken in any month for 10 years. Imports from the United States in September amounted to 361,917 net tons, or two and one-half times the volume in September last year." These figures were based on a report of the Dominion Bureau of Statistics at Ottawa. Continuing, Mr. Madeira stated that shipments of 1,952,351 tons for the first nine months of the year were 31 percent ahead of the 1938 figure of 1,492,275 tons.

Iron and Steel Scrap Survey

Authentic information on stocks of iron and steel scrap, a matter of unusual significance from the viewpoint of national defense, will be made available as the result of a survey of dealers' and consumers' stocks and the rate of consumption of iron and steel scrap for the month of September, 1939, inaugurated by the Bureau of Mines.

This action is in keeping with the previously announced policy of the Bureau to present timely factual data on the strategic and highly essential mineral raw materials during the present international crisis. Iron and steel scrap, because of its tremendous importance to the steel industry, is regarded as a vital industrial raw material.

Secretary of the Interior Ickes stated that the recent rise in steel activity emphasized the need for careful watching of the situation in ferrous raw materials. Adequate data are available on iron ore and pig iron, he said, but little is known as to the present stocks of scrap. The need for supplying this major deficiency in facts pertaining to the iron and steel industry has been acknowledged widely by leaders in industry and Government, and the Secretary urged the patriotic cooperation of both suppliers and consumers in contributing accurate and prompt reports on their scrap position.

West Virginia Institute Attacks Venezuelan Trade Treaty

Scores of West Virginia coal mining men have strongly urged the annulment by legislation of the Venezuelan Reciprocal Trade Agreement which reduces by 50 percent the duty on imported oil. Gathering in Morgantown for the annual meeting of the West Virginia Coal Mining Institute, members adopted unanimously a resolution deploring the action of the State Department in concluding a treaty which would enable "increased quantities of imported oil to reach Atlantic seaboard ports to displace coal in the consuming markets, curtailing production and consumption of coal and increasing unemployment of miners."

More than 100 coal operators from all parts of the state registered for the Institute's thirty-second annual meeting. F. F. Jorgensen, president of the Institute, welcomed all the visitors, and introduced the speakers at the technical sessions.

Recent developments in rubber-tired haulage were described by Arthur Knoizen, of Joy Manufacturing Co., who used a moving picture in technicolor to illustrate important points concerning mechanical loading with this improved type of haulage.

"Mechanical Cleaning of Coal for Commercial and Railroad Fuel Uses" was the subject of a paper by Joseph Pursglove, Jr., Pursglove Mining Co., who outlined a number of important factors which are blocking more widespread application of modern coal cleaning equipment in the United States. In concluding, he said, "So the cleaning plant becomes a necessary adjunct to the mine mechanized underground because it permits the low cost mine to reduce cost even further, and at the same time to turn out a uniform product superior even to that shipped when hand loading was employed underground. In other words, when we think of a fully mechanized mine it should be one that is mechanized from stem to stern, and not in stem only. A recognition of these basic principles of full mechanization has brought about the construction of

four large cleaning plants in Monongalia County alone in the past two years, and more will doubtless be filled in the next two years. Several large plants have been built under similar circumstances in Logan County in the past three years. Scores of others have been built in the state of West Virginia and all over the United States as a basic part of various coal companies' complete mechanization programs. This, to my way of thinking, is the healthiest sign in the entire industry because it is the only logical approach to the problem of combating oil, gas and water power competition —by producing the best product that modern coal cleaning science will permit at the lowest possible cost to the consumer that modern mechanical coal loading devices will permit."

In a paper entitled "The Use of Welded Rail in Main Line Tracks," C. C. Hagenbuch, Hanna Coal Company, briefly described tests made by his company on various types of welded rail joints, all of which have led to the company's standardizing on thermit welded joints for all long life main line track. He stated that the company is at present planning the installation of approximately two miles of new haulage road, all to be thermit welded. After analyzing comparative advantages and costs of thermit welded joints, with an 80-pound angle-barred and bolted joint, he summarized the savings which justify the higher installation cost amounting to $2.24 per joint as: (1) decreased rolling stock wear, (2) increased track life due to decreased rail wear at joints, (3) savings in road cleaning, (4) fewer derailments and decreased wreck expense, (5) lower track maintenance cost, (6) power savings, and (7) increased speed limit for main line haulage.

Detailed problems regarding power distribution for the mechanical mining of coal were outlined by R. E. David, power engineer of Appalachian Power Co., who illustrated important points by citing case histories of several mines. As a final word of warning, he remarked, "Do not wait until you are in trouble before attempting to make correction. Plan your electrical layout in advance and be ready with a solution when needed. You will save in repair bills and lost tonnage."

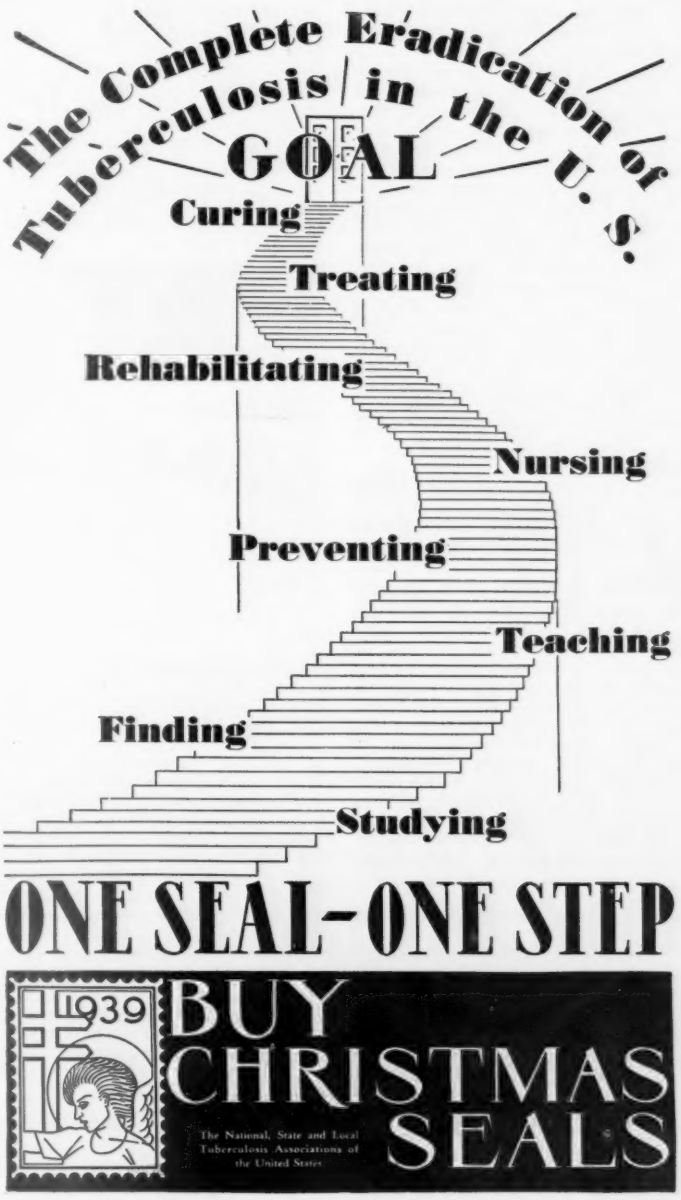
"Dry Cleaning Fine Sizes of Coal" was the subject of a paper by H. D. Bowker, preparation engineer of West Virginia Coal & Coke Corp. After outlining the difficulties encountered in cleaning the minus 20-mesh product, he cited various attempts made to do this, which culminated in use of a stainless steel cloth, with very satisfactory results. Generalizing on fines removal, he said, "In some districts coal is dedusted by removing the fines which are often rejected, and not always is the rejection due to same being of inferior quality. The removal of fines mentioned in many instances, creates perhaps an unnecessary waste that from an operating standpoint certainly cannot be afforded. Such a practice can well be viewed with alarm."

A paper describing the Use of Automatic Duck Bills in Connection with Shaker Conveyors for Trackless Mines, by D. M. Duncan, Goodman Manufacturing Co., concluded the program on operating problems.

The annual banquet of the Institute was held in the evening, with Jesse B. Sullivan, secretary of the West Virginia Coal Association, speaking on the subject, "Coal, The Basic Industry." Commenting on the current position of the coal industry, he said, "While the production of coal in West Virginia has witnessed a healthy increase during the months of August, September and October over both 1938, which was a year of depression, and over 1937, the best business year since the beginning of the depression in 1929, I am not sufficiently sanguine over the future to advise any fair weather operators to reopen abandoned mines because of the increased consumption of coal in recent months."

C. W. Connor, superintendent of mines, was elected president of the Institute, succeeding F. F. Jorgensen, who was named to the executive board.

Other officers chosen are: W. J. German, W. G. Crichton, T. E. Johnson, John T. Sydnor and Max Forrester—all vice presidents; D. L. McElroy, secretary-treasurer; and E. B. Agee, R. J. Burmeister, Carel Robinson, N. P. Rhinehart and F. F. Jorgensen —members of the executive board.



Carlton Tunnel Progresses At Record Speed

Mining men the world over are keenly interested in the rapid progress made in driving the new Carlton tunnel, near Cripple Creek, Colo., the largest privately financed project of its kind in the United States. Work on the Carlton tunnel which started July 10, is progressing at the rate of approximately 50 ft. a day with the bore now 5,300 ft. underground. When completed the tunnel will drain water from below the richest ore bodies in the Cripple Creek district, the greatest gold mining camp in America.

The project is being financed and driven by the Golden Cycle Corporation of Colorado Springs, the largest mine operator in Cripple Creek. Not one dollar of public money will be used in building the new deep drainage tunnel.

The project has been in contemplation for a number of years and much geological work was done in preparation for the beginning of actual construction. Alfred H. Bebee, vice president in charge of mining operations for the Golden Cycle Corporation, is in direct charge of the tunnel work, with John Austin, one of the most famous tunnel builders in this country, acting as superintendent.

Using three shifts of men, work on the tunnel has progressed steadily since the portal was opened in July. Speeding up from a maximum average of 30 ft. a day in the first month of operations, the crews soon hit an average of 40 ft. daily, and now have reached what is believed to be an all-time world record in tunnel work of 49.75 ft. in a 24-hour period.

The 8 x 8 ft. bore will be six miles long when completed, and unless unforeseen difficulties are encountered will be finished in less than three years.

The economic benefit to the Cripple Creek district and to the state of Colorado from the building and completion of the Carlton tunnel will be tremendous. It already has given employment to many men, and when the work is completed will provide employment to several hundreds more as the direct result of the opening of many deep-level mining operations. Completion of the tunnel will extend the life of the Cripple Creek mining district for many years, will stimulate the production of gold and will be of considerable benefit to the entire state of Colorado in aiding in solving its unemployment problem.

The new Carlton tunnel was first discussed by the late Leslie G. Carlton, who, with his brother, the late A. E. Carlton, headed the Golden Cycle Corporation for many years. These two men also promoted the building and largely financed the old Roosevelt drainage tunnel in the Cripple Creek district.

The Roosevelt tunnel was started in 1907, the portal being at an elevation of 8,033 ft. above sea level and about 2,100 ft. below the level of the deepest mining operations in the Cripple Creek district at that time. The Carlton tunnel portal is at an elevation of 6,890 ft. and will drain a highly mineralized area containing 30 square miles, or more than 20,000 acres. The cost of the Roosevelt tunnel was $812,000 as compared to an estimated cost of approximately $1,000,000 for the new project.

The Cripple Creek district, as it is generally known among geologists and mining men, is an area of volcanic rock, full of crevices and cavities, elliptical in shape, three to five miles in diameter and surrounded by a rim of impervious granite, the country rock of the region. Exploration along the edge of this basin has shown that the contact between the eruptive rock and the granite is nearly vertical, at least to a depth of many hundreds of feet, and the camp which has produced many millionaires in its almost 50 years of existence may be likened to a rough edge basin containing a water-soaked sponge which protrudes at points above its rim.

Surface waters soaking down into the volcanic rock for countless centuries have saturated it up to a level corresponding with the lowest points in the uneven granite rim and the early operations in the camp, mainly on slopes or summits of higher elevations, encountered no water. The camp originally was considered "dry," but as shafts were sunk to depths lower than the edge of the rim, water was encountered.

To handle this water it was necessary to pump or to construct tunnels for drainage purposes. Drainage by tunnel is far cheaper and more satisfactory than pumping; consequently, a series of tunnels to drain the mining district have been driven in the life of the gold camp.

The success of the earlier tunnels has brought about an insistent demand for years that a new tunnel be driven to drain the Cripple Creek district to a depth of from 700 to 1,000 ft. below the present level of the old Roosevelt tunnel. Consequently, the reason for the building of the Carlton tunnel, which will permit mining in the Cripple Creek district to a depth of 1,100 ft. below the present water level under a highly mineralized area, is easy to understand.

There is no question but that rich values and large quantities of gold ore will be opened up and mined in the area lying between the present Roosevelt tunnel and the new Carlton bore.

At present there is more activity in

Starting drilling operations at the portal of Carlton Tunnel

A large crowd turnod out to witness the dedication of the tunnel September 4

Broken rock from tunnel is disposed of by self-dumping cars

the Cripple Creek district than for several years. There is every reason to believe that Cripple Creek in the months and years to come will experience its greatest boom since the days following the discovery of the gold camp in 1891. At one time the district boasted of a population of 30,000 people.

The Golden Cycle Corporation is headed by Merrill E. Shoup of Colorado Springs, who became president of the company following the death of Leslie G. Carlton in September, 1938. Mr. Shoup was associated with the Golden Cycle for several years as attorney and assistant to Mr. Carlton. Other officers are Max Bowen, of Colorado Springs, vice president in charge of milling operations; A. H. Bebee, of Cripple Creek, vice president in charge of mining operations; William I. Howbert and Joseph F. Underwood, both of Colorado Springs, treasurer and secretary, respectively. The directors are Mr. Shoup, Mr. Howbert, Mr. Underwood, Mrs. Ethel Carlton, J. S. Tucker—all of Colorado Springs—W. P. Tanner of New York, and W. A. Kyner of Cripple Creek.

Fire Sweeps Dun Glen Tipple

One of Ohio's most modern coal washery and cleaning plants was completely crippled November 5 when flames swept the tipple of the Dun Glen mine of the Hanna Coal Co. Although not definitely known, it is believed that a blow torch in the hands of a careless workman ignited coal dust in the tipple; the fire spread so rapidly that efforts to quench it were unavailing. Tipple and washery were a complete loss.

Operations at the fully mechanized mine have been suspended until the 3,000-ton per day surface plant is rebuilt, requiring some three months.

Leith Analyzes Mineral Status of Belligerents

"Sheer weight of metal" will bring victory to the Allies, Dr. C. K. Leith, Chairman of the Minerals and Metals Advisory Committee to the Assistant Secretary of War, declared recently in a lecture at the celebration of the seventy-fifth anniversary of Columbia University School of Engineering.

"Unless there is a social or political break in the Allied front which will impair the blockade, or unless Germany can wrest the control of the seas from the Allies, the ultimate defeat of Germany by the inexorable pressure of raw material sanctions seems inevitable," Dr. Leith said. "It is a question of sheer weight of metal."

A probable outcome of the war will be an extension of public control of mineral resources, both national and international, according to Dr. Leith, who is professor of geology at the University of Wisconsin and an authority on the world minerals.

"The plexus of controls of one kind or another already in existence—public and private, national and international—may evolve into what amounts to international control of minerals," Dr. Leith pointed out in discussing "The Role of Minerals in the Present War." "Whatever its merits or demerits, whether we like it or not, such control seems to be coming on. The problem now is to find out how intelligently we may direct that control in the interest of public welfare and peace."

"The present war seems to be resolving itself into a war of sanctions, with mineral raw materials high up in the list," he continued. "Germany's most critical needs for minerals in bulk are oil, copper and iron, though there are many other deficiencies of minerals needed in smaller volume, notably nickel and tin. None of the bulk minerals can be secured in sufficient quantities from the countries to the east, including Russia.

"Access to the northern Swedish iron ore is a paramount need. Usually two-thirds of this is brought into Germany from Narvik on the Norwegian Coast but now it will all have to be transported through Lulea, on the Gulf of Bothnia, which is frozen during the winter. The closing of this source of supply will be a difficult problem for the Allies, and Baltic strategy will largely center around it.

"No one knows how far Germany has protected herself in the accumulation of stocks, but the best estimates so far as mineral deficiencies are concerned seem to be about six months. This does not mean the end of the war in that time because no one knows how far substitution and the use of inferior materials may prolong the German effort.

"Assuming an Allied victory, will any attempt be made to do something about the administration of the world's mineral resources in such a way as to minimize this cause of war? Inequalities of distribution of raw materials among nations played a part in starting the last war and in its outcome. They have played a part during the growing international difficulties in the interval between the last war and the present war. They loom now as primary objectives of Germany and other 'have-not' nations. Their control by the Allies seems likely to determine the outcome of the present war.

"An insistent call is now coming from many quarters for a clear statement of the purposes of the war. In view of the fact that the demand for equality of access to raw materials has been one of the important causes of this and the last war, the consideration of this subject should not be omitted from any statement of war objectives."

To maintain the status quo in the world control and distribution of mineral supplies means the control of over three-fourths of the world's minerals by the United States and the British Empire, Dr. Leith stated.

"From our point of view this is a pleasant and desirable status. We sell the products freely to anybody who can pay for them and the supply is such that there is enough for all. Why should anybody complain?

"The answer on the part of some of the 'have-not' nations is that we have too much advantage in case of commercial emergencies; that we will not accept enough of their products in exchange; that we have occasionally held up the rest of the world without sufficient consideration of the consumers' position; that in case of war that we can and do cut off access to raw material sources; that they want a share in the control both for peace and war.

"However unfair this demand may seem, to go back to the pre-war economy of minerals without change will simply mean the necessity for future protection of the status quo by force, as it has been maintained from time to time in the past."

Dr. Leith suggested careful study of the grievances of the "have-not" nations to see how far they may be ameliorated. "Self-interest may invite this procedure as a desirable alternative to the expensive maintenance of the status quo by force," he added.

Professor Leith reviewed several possibilities which should be studied, including changes in the control and procedure of cartels, revision of tariffs, collective guaranty of mineral supplies both in peace and war, and others.

"As the largest consumer and producer of minerals in the world, with wide interests in world sources and markets, the United States must necessarily share largely in any solution of this problem," Dr. Leith concluded.

Eagle-Picher Ordered To Withhold Union Recognition

Eagle-Picher Lead Co. has been ordered by the National Labor Relations Board to withhold exclusive recognition of the Blue Card Union, affiliated with the American Federation of Labor, or any other union until the Board has certified one as the exclusive representative of the company's employes. The Board claims that the Blue Card Union was company-supported before the Labor Relations Act was passed, and that the support was continued after it affiliated with the A. F. L. The Board ordered reinstatement with back pay of about 200 workers.

Eagle-Picher Company has resumed production of the Grace Walker mine, south of Picher, Okla., and at the Hum-Bah-Wah-Pah No. 3 mine at South Cardin, both of which mines have been idle since 1930.

Also, the company has completed dewatering its No. 2 shaft and underground workings on the Southside lease, and was scheduled to start mine operations early in November.

Bunker Hill and Sullivan Mining Company has started construction of a new dry ore reduction plant at Kellogg, Idaho, for the principal purpose of extracting antimony from ores in the Coeur d'Alenes and from ores along the Salmon River in central Idaho. The electrolytic process will be used, and the cost of construction will be nearly a half million dollars.

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Illinois Coal Operators Reelect Peltier

At the eleventh annual meeting of the Illinois Coal Operators Association, held in Chicago, November 14, the following were elected as members of the executive board until the next annual meeting: D. W. Buchanan, G. B. Harrington, H. E. Howard, T. C. Mullins, M. F. Peltier, T. J. Thomas and W. P. Young.

Immediately following the close of the meeting, the executive board met and reelected Mr. M. F. Peltier as chairman. The board also reelected the following officers and general counsel for the ensuing year: president, M. F. Peltier; secretary, Fred S. Wilkey; treasurer, O. M. Gordon, and general counsel, Thurlow G. Essington.

Wheels of Government

(*Continued from page* 43)

mits, in the areas named, working employes 56 hours a week, but not to exceed 12 hours in any one day, for fourteen weeks in the aggregate in any calendar year before payment of time and one-half. The issuance of this seasonal exemption was predicated upon representations made to the Exemptions Section at a hearing on June 20 by Secretary Julian D. Conover of the American Mining Congress. It is the first exemption of its kind which has been granted, and is the maximum possible under the present statutory provisions of the law.

The Economics Section, Wage-Hour Division, has mailed its questionnaire to the non-ferrous metal producers of the country as a part of a survey of the effect of the Wage-Hour Act on the operations of mineral producers. Two members of the staff of the Economics Section are now traveling through the West for the purpose of personally contacting mining men and thus securing at first hand their views of the present situation. It is understood that the results of this survey will be reported to Chairman Mary Norton of the House Committee on Labor in response to a request made last July when the Committee was considering amendments to the Wage-Hour Act.

Bituminous Coal

While there is no doubt that Secretary of Interior Ickes is bearing down for speed in the fixing of coal prices, the mechanics of the procedure indicate that the final promulgation cannot now be expected until April 1, 1940, or later. The artificiality of the Guffey Act and its administration are indicated in a ruling made early in November by Comptroller General Fred H. Brown, a former United States Senator from the coal-conscious State of New Hampshire, that the Federal Government in the purchase of its coal will not be required to pay the minimum prices if and when fixed and promulgated by the Bituminous Coal Division of the Department of Interior. The ruling affects the sale of 3,000,000 tons or more of bituminous coal each year, and states that it is an incorrect assumption to believe that the United States Congress intended to impose any such burden on the Federal Treasury. Opponents of the Guffey Act contend that this shows it up as a type of class legislation which exacts a tax from consumers, little and big, which the Government itself considers unjustified and refuses to pay.

Bituminous coal producers suffered another blow in the recent promulgation by the Department of State of the foreign trade agreement with Venezuela wherein the import excise tax on crude petroleum and fuel oil was cut in half. There is little comfort in the quota limiting importations under the reduced import tax to 5% of the crude petroleum processed in American refineries in the preceding calendar year, since this volume amounted in 1938 to 58,251,000 barrels, surely enough to affect the fuel oil market and thereby make the competitive marketing problem of bituminous and anthracite coal more difficult.

The policy pursued by the Federal Government toward the bituminous coal industry is causing many producers to question whether they would not be better off without the Guffey Act and the one cent tax per ton on their coal which has already amounted to between $7,000,000 and $8,000,000, plus an equal or greater amount spent for district boards, counsel fees and extensive travel. The industry has made excellent progress in cost reduction through the modernization of its mining practices and equipment, a work in which the American Mining Congress has played no small part.

Real progress is also constantly being made in guarding the lives, limbs and health of the workmen in the mines, and yet we have the spectacle of the Secretary of Interior going far afield in trying to get the United States Congress to pass the Neely Compulsory Coal Mine Inspection Bill while there now exists ample authority for the Bureau of Mines to expand its much needed and greatly appreciated consulting safety and inspection service to the industry. Members of the Senate Committee on Mines and Mining who heard the testimony on the Neely Inspection Bill were unable to see any real need for its enactment; this is but another example of the confusion existing in the puzzling array of Federal Government's policies toward the solid fuels.

Strategic Minerals

(*Continued from page* 3)

present be classed as commercial, first for the purpose of devising methods by which such material could be utilized in a national emergency, and second, in the hope that such material might be raised to commercial grade.

The stated objective of the Act is to carry out such investigations "as may be necessary to determine the extent and quality of such deposits, the most suitable methods of mining and beneficiating them, and the cost at which the minerals or metals may be produced."

Thus, the cost of production of needed metals from domestic deposits is to be determined in addition to the objectives previously discussed. This will be an end-product of the investigations which must be borne in mind during the course of the work, but probably cannot be conclusive until near the end of the program, except with respect to some individual projects that may be completed earlier.

It is hoped that this may be but the beginning of a long-range program permitting a comprehensive and systematic examination of our strategic mineral position, which should include not only the determination of reserves and the cost of production, but also the preparation of complete detailed plans for developing and mining those deposits that may be found to contain substantial reserves, and for the beneficiation and the extraction of the metals from their ores in usable form. Should a crisis arise suddenly, much larger annual appropriations than authorized by the present Act would be required to expedite the program.

It is planned tentatively to publish progress reports from time to time during the course of the investigations, as information is gained that may be of public interest, and that final reports will be published jointly by the Bureau of Mines and the Geological Survey summing up the different phases of the problem—geological, mining, metallurgical and economic.

PERSONALS

Lloyd J. Speed has been elected president of the Black Star Coal Company and the Pioneer Coal Co., properties capitalized respectively at one and one-half million dollars and six hundred thousand dollars. Mr. Speed succeeds **Frederick M. Hackett**, former United States Senator and Ambassador to Germany, as president of the two companies, who was elected chairman of the board of directors, following his resignation as president.

Mr. Speed has been associated with both companies in various capacities for some 20 years.

Lawrence B. Wright, of Wright, Dolbear & Co., Ltd., has been in the West for the past two months, where he has examined mines in Montana, Washington, Idaho and California.

H. F. Hebley was placed in charge of the Product Control Department of Pittsburgh Coal Co. on November 6, in which capacity he will direct all matters pertaining to the control of quality of products, production scheduling, and research. At the same time, **J. E. Norton** was transferred to the Industrial Relations Department of Pittsburgh Coal Co. as assistant industrial relations manager. Mr. Norton will be succeeded by **D. H. Davis** as production scheduler, reporting to the product-control manager.

Grover E. LeVeque has been appointed general superintendent of the Interstate Iron Co. and the Jones & Laughlin Ore Co., succeeding the late **Mark Elliott**, who died October 31. Mr. LeVeque has been associated with the ore interests of the Jones & Laughlin Steel Corp. since 1912, having served in various capacities until December, 1936, when he was appointed assistant general superintendent. His headquarters will continue to be at Virginia, Minn.

Owen D. Young, chairman, and **Gerard Swope**, president of the General Electric Co., will retire from their positions December 31, in line with the company's retirement policy. Mr. Young will become honorary chairman and Mr. Swope honorary president, and both will remain as directors.

Charles E. Wilson, executive vice president, and **Philip D. Reed**, assistant to the president were elected to succeed Mr. Swope and Mr. Young as president and chairman, respectively.

Mr. Reed has been with General Electric since 1926, when he joined the Law Department. He was made assistant to the president in December, 1937, prior to which he was general counsel for company's lamp department. Mr. Wilson joined the Sprague Electric Co., New York, in 1899, which later became a part of General Electric. Mr. Wilson has been executive vice president since 1937.

Harry L. Cox, manager of the Marion Steam Shovel Company's Philadelphia office, recently established a branch office at Pittsburgh, Pa., to handle the western section of that state. **John Quigley** will be in charge of the Pittsburgh office, with headquarters at the William Penn Hotel.

C. C. Ballard, master mechanic for The New River Co., received well-earned recognition of his enviable 33-year record of service for the company in a full-page write-up in the October issue of The New River Co. employes' magazine. Mr. Ballard has also done fine work during past years as vice chairman of the Power Committee of the American Mining Congress Coal Division, and was recently made chairman of that important committee.

Herbert George Moulton, consulting engineer of New York City, was elected president of the American Institute of Mining & Metallurgical Engineers at a meeting of the board of directors held November 20 in New York.

Two newly elected vice presidents of the Institute were **Erle V. Daveler**, vice president, Utah Copper Co., and **W. M. Pierce**, chief of research for New Jersey Zinc Co. Three new directors included **Holcombe J. Brown**, consulting engineer; **Frank A. Wardlaw, Jr.**, assistant general manager of Inspiration Copper Co.; and **Felix E. Wormser**, secretary and treasurer of Lead Industries Association in New York City. Reelected as directors were **John M. Boutwell**, mining geologist of Salt Lake City; **Karl Eilers**, mining engineer of New York City; and **Harvey S. Mudd**, president of Cyprus Mines Corporation, Los Angeles.

Brent Hart, president of the Hart Coal Co., Mortons Gap, Ky., was wounded by a bullet in the left thigh on November 8 when a band of 250 to 300 men attacked workers at his operation. In all probability the attack resulted from animosity between the United Mine Workers of America and the Progressive Miners Union.

Gilbert Watt Humphrey and **Miss Louise Ireland**, both of Cleveland, Ohio, have announced their wedding date as December 27. Mr. Humphrey is the son of **George M. Humphrey**, president of the M. A. Hanna Co., and Miss Ireland is the daughter of **R. L. Ireland, Jr.**, president of the Hanna Coal Co.

H. H. Simmons, advertising manager of Crane Company, has been promoted to manager of advertising and sales promotion, succeeding **Russell G. Creviston**, who assumes a new position, Director of Trade Relations, both promotions having become effective September 1.

Mr. Simmons has had 15 years' experience in advertising and merchandising a wide variety of industrial and building products before joining Crane Company four years ago. Mr. Creviston has been director of advertising and sales promotion for Crane Company for the past 10 years.

Dr. Robert M. Dickey, head of the Geology and Mineralogy department of Michigan College of Mining and Technology since 1936, has resigned to become sales engineer with the Bucyrus-Erie Co., with headquarters in Chicago. **Dr. Thomas M. Broderick**, chief geologist with the Calumet and Hecla Consolidated Copper Co., has agreed to serve as acting head until a permanant successor can be named, probably about January 1.

W. C. Gillies, formerly employed at the Ironton mine on the Gogebic Iron Range, is now with the Construction Sales Corporation of Albany, N. Y. He is the son of **Donald B. Gillies**, vice president of the Republic Steel Corp.

Chester Thompson has been appointed chairman of the advisory board and president of the Inland Waterways Corporation, succeeding General T. Q. Ashburn, who resigned effective November 14.

Cornelius F. Kelley, president of the Anaconda Copper Mining Co., has been named chairman of the 1940 campaign for funds of the Boy Scout Foundation of Greater New York.

Charles W. Connor, Jr., formerly general engineer in charge of mechanical loading for American Rolling Mill Co., at Nellis, W. Va., is now on the engineering staff of Inland Steel Co., at Wheelwright, Ky.

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—Obituaries—

Mark Elliott, Sr., general superintendent of the Interstate Iron Co. since 1907, died October 31 at the age of 74. Mr. Elliott was one of the best known and most highly respected mining men of the Lake Superior district, and in late years had been affectionately referred to as the dean of active mining men on the Mesabi Range.

Foster S. Naething, manager of Mammoth-St. Anthony, Ltd., and vice president of St. Anthony Mining & Development Co., died October 24 in Glen Cove, N. Y., at the age of 52. His death followed a heart attack suffered nine days previously. Mr. Naething's associations with the Mammoth - St. Anthony and St. Anthony Company dated from 1934. He was also a director of the Barard Mining Co. at the time of his death.

Following his graduation from Yale Sheffield Scientific School, Mr. Naething served for a year as assistant instructor in metallurgy at that institution, and in the same year (1908) he joined the engineering staff of United Regal Mines Co. He next joined the engineering staff of Miami Copper Co., where he was made assistant to the superintendent in 1913. He then undertook consulting work for two years, following which he was named field engineer for the St. Joseph Lead Co., where he remained three years. He next joined the staff of Kansas Exploration for two years as manager, following which he took up consulting work again, continuing in that field from 1924 to 1930, when he was named vice president and general manager of the Evans Wallower Lead Co. A little later on, in 1932 and 1933, Naething was associated with Dr. U. C. Tainton and the Bethlehem Steel Co. in developing bethanized wire, and in 1934 he took over the positions which he held at the time of his death.

Theodore S. Barber, president of the Morris Run Coal Company and a director of the Lehigh Valley Coal Company, died suddenly at his home in Wilkes Barre, Pa., of a cerebral hemorrhage at the age of 67. Mr. Barber had been identified with the coal industry for the past 40 years.

Joseph N. Schweitzer, formerly of Huntington, W. Va., and for the past 26 years a prominent coal operator of Southern West Virginia, died unexpectedly at his home in Londale, W. Va., October 28. He was 72 years old.

Robert Brown, construction superintendent of the Hart Coal Co. at Mortons Gap, Ky., was shot when a mob which numbered 250 to 300 attacked company workers at the mine on November 8.

Adolph W. Vogt, comptroller of the U. S. Steel Corporation of New Jersey, and widely known for his distinguished record in the field of cost accounting, died suddenly of a heart attack November 20 while returning to his home in Montclair, N. J. Mr. Vogt was one of the few remaining officials of the U. S. Steel Corporation who was with the organization at its formation in 1901. He became chief statistician of the corporation that year, and was appointed assistant comptroller in 1915. In 1936 he was made comptroller.

Robert L. Stearns, chairman of the board of directors and virtual owner of the Stearns Coal & Lumber Co., died in Tucson, Ariz., November 2 at the age of 67. Several years ago Mr. Stearns suffered a paralytic stroke from which he never recovered.

George D. Guggenheim, 32, son of Simon Guggenheim, president of the American Smelting & Refining Co., died November 9 in New York City.

Dr. Francis M. Simonds, New York mining engineer, died November 16 in an Atlanta hospital following a brief illness. His age was 73.

Knotty Problems Discussed at Coal Conference

(*Continued from page* 41)

The following committee members were present: J. J. Sellers, Virginia Iron, Coal & Coke Co. (chairman); F. E. Bedale, Consolidation Coal Co., Inc.; M. L. Coulter, Clearfield Bituminous Coal Corp.; J. T. Ryan, Mine Safety Appliances Co.; H. C. Stelling, National Carbon Co.; Geo. C. Trevarrow, Harwick Coal & Coke Co., and C. E. Young, Wheeling Township Coal Mng. Co.

Committee on Stream Clarification

A Committee on Stream Clarification is being organized under the chairmanship of J. W. Woomer, and a preliminary meeting was held to outline the scope of their studies and report. The purpose of this Committee is to compile and present to the coal industry facts on various methods that have been proposed or experimented with to reduce the acid content of mine water discharged into streams.

The following members were present: J. W. Woomer, Warner Collieries Co. (chairman); M. L. Coulter, Clearfield Bituminous Coal Corporation; R. D. Leitch, Chemical Engineer, USBM, and David B. Reger, consulting geologist.

The Wilshire Oil Case

(*Continued from page* 38)

have actually been explained to the Committee of Congress in charge of revenue legislation. By the reenactment of the statutory provision (even though by a subsequent Congress) without material change, we are justified in accepting the Treasury's interpretation as the meaning which the Congress originally intended the provision to have. But this doctrine has no application to legislative Regulations. Validly promulgated legislative Regulations are as effective as the statute itself. There is no necessity for legislative adoption.

Examined in the light of this analysis, the causes of the confusion in the Wilshire opinion are clear.

Butte Copper and Zinc Resumed

Mining operations of manganese and zinc were resumed by the Anaconda Copper Mining Co., lessee of the Emma Mine of the Butte Copper & Zinc Co., at Butte, Mont., on October 15, according to A. A. Shelare, president of the latter company.

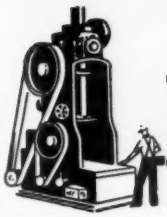
New Potash Plant For New Mexico

Plans for spending about $2,500,000 for mining and processing potash minerals near Carlsbad, N. Mex., were announced recently by Louis Ware, new president of International Agricultural Corporation. It is expected that the plant, having a productive capacity of 70,000 tons of potassium sulphate and an equal tonnage of 60 percent muriate of potash yearly, will be in operation by next summer.

For three years the research and engineering facilities of the corporation have been concentrated on developing the possibilities of potash deposits owned by Union Potash & Chemical Co. in New Mexico. These deposits are estimated as sufficient to last 40 years or more at the plant's rated capacity. International Agricultural Corporation has a controlling interest in Union Potash.

"This development will provide the first mine to produce potassium sulphate direct from native ores in the United States," the company stated. "The proposed methods and processes for potash production have been proved to the satisfaction of International's technical staff, and also have been checked and approved by well known independent consultants.

"Under present war conditions, with importations greatly lessened, there is an opportunity for the new potash project of International to gain quickly its place in the industry. The company does not consider this a temporary project, but has based its estimates for this investment on normal conditions."



MANUFACTURERS' Forum

Hotmill for Reconditioning Jackbits

A production machine, known as the Jackmill, has been developed by Ingersoll-Rand for reconditioning their detachable rock drill bit, the Jackbit.

This hot milling machine is built in two sizes, the JMA, which redresses 110 to 180 Jackbits per hour, and the JMB, which redresses 75 to 90 Jackbits per hour. Both machines are equipped with electric-motor drive. The feed mechanism of the JMA is air-operated.

Each of these Jackmills has a single cutter which does both gauging and sharpening. The cutter of the larger mill will redress 40,000 to 60,000 bits,

and the cutter of the small mill will handle 15,000 to 30,000 bits before it needs resharpening. These cutters can be reconditioned a number of times, so that the cutter cost per Jackbit sharpened runs less than 1 mill.

Another important feature is the fact that due to a slight flow of metal during the milling operation, it is possible to hold the bit's gauge size longer. This increases the life of a Jackbit 30 to 50 percent.

Details covering the cost-cutting features of these new machines are contained in an illustrated folder, Form 2579, copies of which are available from the Ingersoll-Rand Company, 11 Broadway, New York City, or any of its branch offices.

Respirator Protects Against Metal Fumes

Willson Products, Inc., 278 Thorn Street, Reading, Pa., announce the first and only Bureau of Mines approved type B mechanical-filter respirator for protection against fumes of metals.

This new product, designated as Willson respirator No. 770, bears Bureau of Mines approval No. 2128 "for protection against fumes of metals such as lead, mercury (except mercury vapor), manganese, magnesium, aluminum, antimony, arsenic, copper, chromium, iron, cadmium, and zinc resulting from sublimation or the condensation of their vapor, or from chemical reactions between their vapors and gases."

The rubber face mask of the respirator fits snugly under the chin, and an airtight contact is obtained with but slight tension on the adjustable double-elastic headband. Exhalation of used air through a properly placed exhaust valve is aided by twin inhalation valves in the mask interior. The filters may be readily cleaned, and all parts are economically replaceable.

The manufacturer will be pleased to forward descriptive literature and prices upon request.

Hand Operated Carbon Monoxide Indicator

The Mine Safety Appliances Company announce publication of a bulletin describing the new portable M. S. A. hand-operated carbon monoxide indicator.

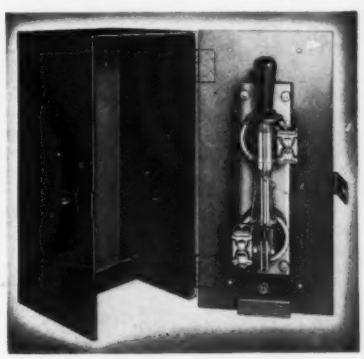
This new product, which satisfies a long-expressed need for an instrument possessing a wider range of utility in the field than any other heretofore available, is small, highly efficient, and provides great simplicity of operation in testing atmospheres for the presence of carbon monoxide. The instrument is sensitive to concentrations of carbon monoxide as low as a few thousandths of a percent, accurate, light, and easy to carry. No wires or other connections are required. The indicator can be used anywhere.

Copies of Bulletin No. DS-2 can be obtained by addressing this publication, or direct to Mine Safety Appliances Company, Braddock, Thomas and Meade Streets, Pittsburgh, Pa.

Quick Break Switch

The Ohio Brass Company, Mansfield, Ohio, announces development of a new standard quick-break switch for circuits of 110-750 volts. Designed for use in railway and mine, trolley and feeder circuits or any other circuits where a quick, wide break is required, the new switch takes advantage of the durability and dielectric strength of Dirigo molded insulation. The switch supports are mounted on two O-B Universal-2 mine hangers. The hangers, in turn, are mounted on a rustproof, hot-dip galvanized steel base.

The type HMC switch is protected



by a heavy steel case which can be locked so that access to the switch and its operation is impossible. The type HM switch is furnished without the case.

Blades and jaws of these switches are of hard, cold-rolled copper of ample cross-section for rated capacities. The cable is gripped by adjustable clamps which tighten by means of two steel set-screws. Furnished with soft rubber handle for protection of the operator, the switches are available in capacities from 400 to 1,500 amperes.

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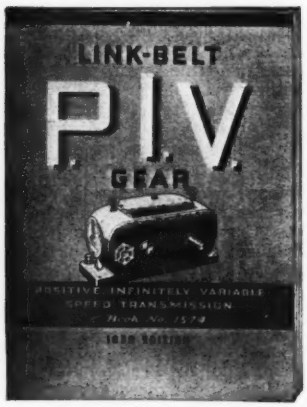
New Gear Sizes Announced

Two new sizes of P. I. V. gear variable speed transmission units are announced by Link-Belt Company, 2045 West Hunting Park Avenue, Philadelphia, and have been included in a new 40-page book, No. 1574, seventh edition. They are No. O size, ½ hp., for speed ratios of 2 to 1 or 3 to 1, and size No. ½, 1½ hp., for ratios of 2 to 1, 3 to 1, 4 to 1.

These smaller sizes, like the larger



units, ranging up to 15 hp. and up to 6 to 1 speed ratio, can be furnished for horizontal or vertical mounting, motorized or without integral motor, and with or without extra speed reduction gear sets.

Other new items included in the book are vernier control for extra-fine speed variations, and a convenient table that makes it easy to select the proper size unit for the service. A copy of the new book will be forwarded to any reader upon request.

Walking Dragline

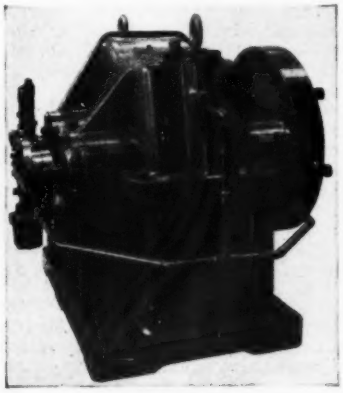
One of the latest contributions to speedy and efficient material handling is the new and modern line of walking draglines now being announced by The Marion Steam Shovel Company, Marion, Ohio. The photo shows a type 7200 walking dragline equipped with a 5-cu.-yd. bucket and a 100-ft. boom, which machine is now in service on one of the placer gold mining operations in California.

The walking type machine has some very desirable characteristics for dragline service, especially on those operations where soft ground may be encountered and where low bearing pressure and extreme mobility are necessary. When digging, the upper frame rests on a large-diameter base or tub, the bearing of which is high in comparison with that of the crawlers on the conventional type machines. This results in a low bearing pressure which makes the machine particularly well adapted to dragline work on soft or marshy ground.

The latest and most modern designs are incorporated in this new line of walking draglines. Adequate strength to meet the digging conditions, fast drag and hoist line speeds, and rapid acceleration and high-rotating speeds assure high outputs and low maintenance with maximum profit to users. These draglines are available with bucket sizes from 3 to 12 cu. yd. in capacity and booms from 80 to 200 ft. in length. Power may be either electric or Diesel, at the user's option.

Speed Increasers

A new line of speed increasers for operating centrifugal pumps, high-speed blowers, and compressors, and for pipe-line service, has been announced by the Westinghouse Electric & Manufacturing Company. Standard gear ratios vary from 2 to 1 to 12 to 1, and these new units are available in

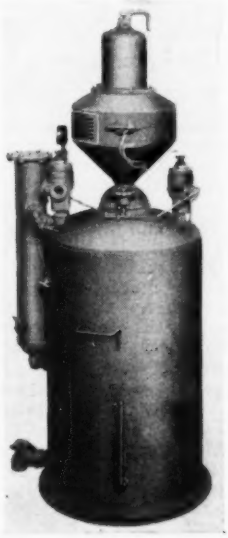


ratings of from one horsepower per 1000 rpm of the high-speed shaft to more than 1800 horsepower per 1000 rpm.

Speed increasers can be supplied for either right- or left-hand assembly. Sleeve bearings have been designed to provide low unit pressures and assure permanent alignment with minimum friction loss. Lubrication is accomplished by a self-contained circulating oil system, including a circulating pump, an oil cooler, strainer, relief valve, and sight flow indicator. Gears are spray-lubricated at the line of contact; all bearings are under pressure lubrication. Frames are split horizontally to permit easy access to all internal parts, and each unit has an easily removable inspection plate. Average efficiency of these units is better than 96 percent.

Portable Acetylene Generator

A new acetylene generator, known as the Oxweld MP-9 Medium-Pressure Acetylene Generator, and designed to combine portability with the operating advantages usually found only in larger units, has just been announced by The Linde Air Products Company, 205 East 42nd Street, New York City.



The MP-9 weighs only 129 lb., and can readily be moved about the shop or in the field. It holds 25 lb. of size 14 ND Union Carbide and will deliver as much as 50 cu. ft. of acetylene per hour at any desired pressure up to 15 lb. per square inch. Several hours of continuous welding or cutting on all except the heaviest work can be obtained from one charging.

The generator produces a smooth flow of clean, dry acetylene with no appreciable variations in pressure. This is particularly valuable in maintaining a stable blowpipe flame. Operation of the generator is extremely simple since only one handle is used to start or stop generation of the acetylene and to adjust the delivery pressure. After starting, operation is fully automatic.

Ring Type Crusher

Just announced by Stephens-Adamson Mfg. Co. is their new ring-type crusher, featuring triangular-shaped manganese steel sectors operating so as to crack lumps rather than crush them, thus minimizing pulverization and excessive fines.

The new line is already being marketed in sizes to handle lumps of all types of bulk materials ranging in size from 6 in. to 26 in.

The combined improvements of the new triangular sector and the use of only two gangs of sectors on the rotor permit handling of larger lumps in a given size machine than was formerly possible.

Bulletin 4939, describing this new

line, is now available at any of the three Stephens-Adamson factories in Aurora, Ill., Los Angeles, Calif., or Belleville, Ontario, Canada; also at any of the S-A engineering sales offices, located in all principal cities.

General Electric Employes Share in Profits

President Gerard Swope announced late in November that under the General Profit Sharing Plan authorized by the stockholders of General Electric Company in 1934, and based upon an estimate of the Company's net income for the year, approximately $2,400,000 of earnings will be available for distribution to employes for the current year, compared with $557,000 for 1938.

The employes will also have received approximately $2,350,000 as a Cost-of-Living adjustment of their earnings for 1939, compared with $3,298,000 for 1938.

Under these two plans, the total additions to regular earnings of eligible employes will amount to $4,750,000 for 1939, compared with $3,855,000 for 1938.

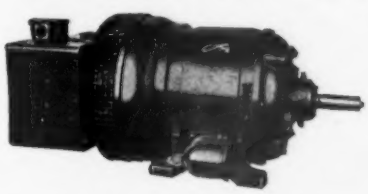
In August the employes received a payment from earnings under the General Profit Sharing Plan for the first six months this year, and on or about December 20 payment will be made for the second six-months period. For eligible employes with five or more years of service, the payment for the last half of this year will be equivalent to 3.75 percent of their earnings, which, together with 2.0 percent for Cost-of-Living adjustment, makes a total of 5.75 percent to be added to their regular earnings for the last six months this year.

The Company now has about 67,000 employes, or 10,000 more than a year ago, Mr. Swope announced.

New Principle in Adjustable Speed Motors

The Louis Allis Co. of Milwaukee states its new Ajusto-Spede motor not only incorporates an entirely new principle in alternating current adjustable speed motors, but that it incorporates many new advantages and economies heretofore not available in A. C. adjustable speed units.

The new Ajusto-Spede motor is



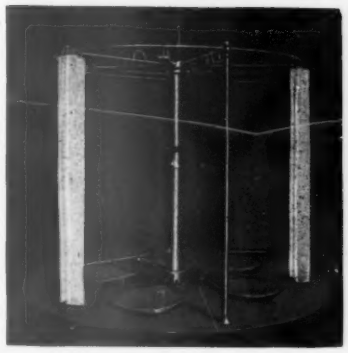
a combination of an eddy current clutch and a standard constant speed A. C. squirrel cage motor. There is no mechanical contact between the driving and driven members of the unit. The speed and torque variations are obtained by controlling the magnetic excitation of the clutch, thereby obtaining any desired slip.

Some of the special features of the unit includes the following: An unusually wide range of speed variation from zero to full speed at full load torque; and the unit can be operated continually at low speeds without overheating.

Remote control available as standard at slight extra cost.

A copy of their new eight-page Bulletin No. 611 describing and illustrating the principle, construction and uses of the unit will be sent upon request.

Showers With Treadle Control



Water is turned on automatically when users stand upon the treadle platform of this shower unit recently announced by Bradley Washfountain Co., Milwaukee, Wis. Pretempered water only is used, assuring complete safety and reducing water consumption

Space-Saving Snubbers

An addition to the present line of Burgess Snubbers, a new series known as the Burgess SDHC series Snubbers, is announced by the Acoustic Division of Burgess Battery Company.

The new line of Snubbers covers a range of standard pipe sizes from 1 to 32 inches. Both size and weight have been reduced by a unique rearrangement of the controlling parts. All of the performance features of the original Burgess Snubber are included in the new Burgess SDHC series Snubbers.

Another change in the new design lies in the substitution of concentric connections for eccentric connections to facilitate installation. Sizes 1 to 4 inches are provided with nipple connections, while sizes 5 inches and larger are provided with flange connections.

The addition of the smaller and lighter Burgess SDHC series Snubbers to the line introduced last year enables engineers to solve their silencing problems on difficult marine and crowded stationary installations. Write to Burgess Battery Company, Dept. NR, 500 W. Huron Street, Chicago, for a copy of the new SDHC Bulletin.

CATALOGS and BULLETINS

• BATTERIES. *The Electric Storage Battery Co.*, Allegheny Ave. and 19th St., Phila., Pa. Section MP-1 is a new catalog covering Exide-Ironclad batteries in motive power service. 20 pages.

• COAL PREPARATION EQUIPMENT. *Roberts & Schaefer Co.*, Chicago, Ill. Bulletin 153 reviews the principles of company's combination wet and dry process, illustrating and briefly describing several outstanding installations made during recent years. 6 pages.

• COMPRESSORS. *Ingersoll-Rand Co.*, 11 Broadway, New York, N. Y. Form 3364 presents a new line of Two-Stage Air Cooled Portable Compressors embodying many advanced features of design. 36 pages.

• CRUSHERS. *Allis-Chalmers Mfg. Co.*, Milwaukee, Wis. Bulletin B-6004 illustrates and describes the company's Superior McCully Crushers—a widely known and extensively used modern type of gyratory primary crusher. 24 pages.

Stephens-Adamson Mfg. Co., Aurora, Ill. Bulletin 4939 on company's Knittel Ring-Type Crusher. 4 pages.

Traylor Engineering & Mfg. Co., Allentown, Pa. Bulletin 113 describes advantageous features of the design and performances of the new Traylor-Stearns Multi-Stage Fine Reduction Crusher. 8 pages.

• HOISTS. *Sullivan Machinery Co.*, Michigan City, Indiana. Bulletin 76-C on company's portable shaft, slope and supply Hoists, in models for every type of shaft sinking, supplying hoisting or materials lifting jobs.

• LOCOMOTIVES. *General Electric Co.*, Schenectady, N. Y. Form 3234 on GE "Sealed-Equipped" Cable-reel Gathering Locomotives for safer haulage in gassy mines. 4 pages.

Bulletin 3071A on company's new Diesel-Electric Industrial Locomotives. 8 pages.

• LUBRICANTS. *Standard Oil Co.* (Indiana), Chicago, Ill. Engineering Bulletin S-49 presents recommended practices for Storage and Handling of Lubricants. 24 pages.

• PROTECTIVE EQUIPMENT. *American Optical Co.*, Southbridge, Mass. Booklet TL 267, "Eyes Are Expensive Targets," contains valuable information concerning costs and causes of eye accidents, and ideas about putting into operation a plan for eliminating the causes and lowering the cost. 16 pages.

• SAFETY EQUIPMENT. *Mine Safety Appliances Co.*, Pittsburgh, Pa. Bulletin CL-4 on company's line of Safety Shoes and Pacs. 4 pages, plus price list.

Bulletin CA-7 on company's H H Inhalator. 6 pages.

Bulletin BH-3 on company's new Trolley Guard Hanger.

• WIRE ROPE. *Hazard Wire Rope Division, American Chain & Cable Co.*, Wilkes-Barre, Pa. Catalog 20 is a virtual pocket-size handbook on Wire Rope, containing information of a practical and technical nature in addition to list prices and specifications of the various constructions of Wire Rope.

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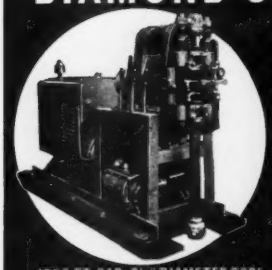

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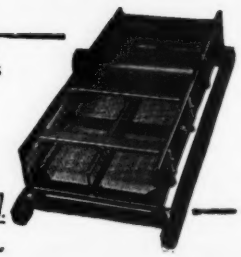

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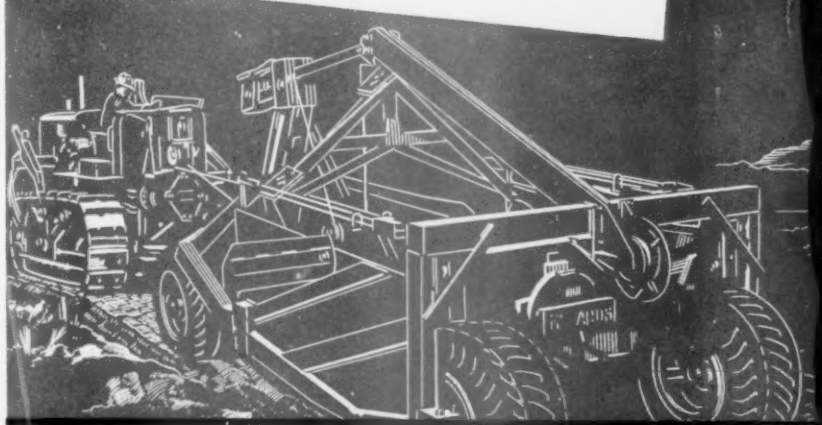

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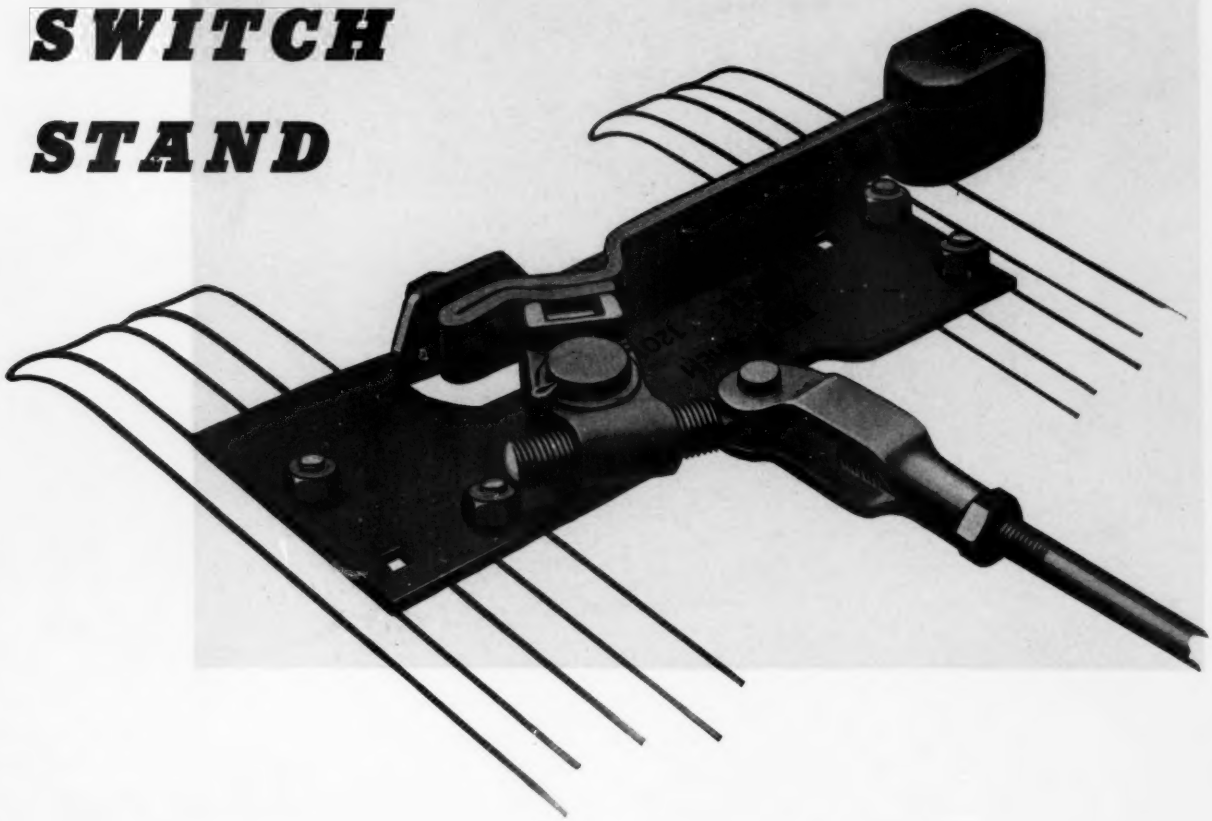
Here's a space-saving SWITCH STAND



for rooms and entries

BETHLEHEM Model 1201 meets all requirements for switch stands for light rails. Low and compact, it stands only three inches above the ties and can be used between rails if necessary. It has a parallel-throw lever, an important safety feature.

In spite of its simplicity, this stand, with its weighted lever, is easy to throw. It has ample leverage to close the points and is self-locking. That is, with points closed in either direction, the throwing mechanism is on dead center and does not require latches or locking devices. Maintenance is next to nothing. Both length of throw and position of points can be adjusted by means of screw-eyes. The stand is self-cleaning and has only three moving parts.

Model 1201 can be used on steel or wood ties, with a spring or rigid rod. It is good for rails up to 30 lb. Model 1217 is recommended for heavier rails, up to 60 lb. inclusive. Model 1222 is the design to use for rails above 60 lb. Information and prices on any of these stands can be obtained from Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

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